FOOD MANUFACTURE

Incorporating "Food Industries Weekly"

LEONARD HILL LIMITED, STRATFORD HOUSE, 9 EDEN STREET, LONDON, N.W.1 JUNE 1, 1956

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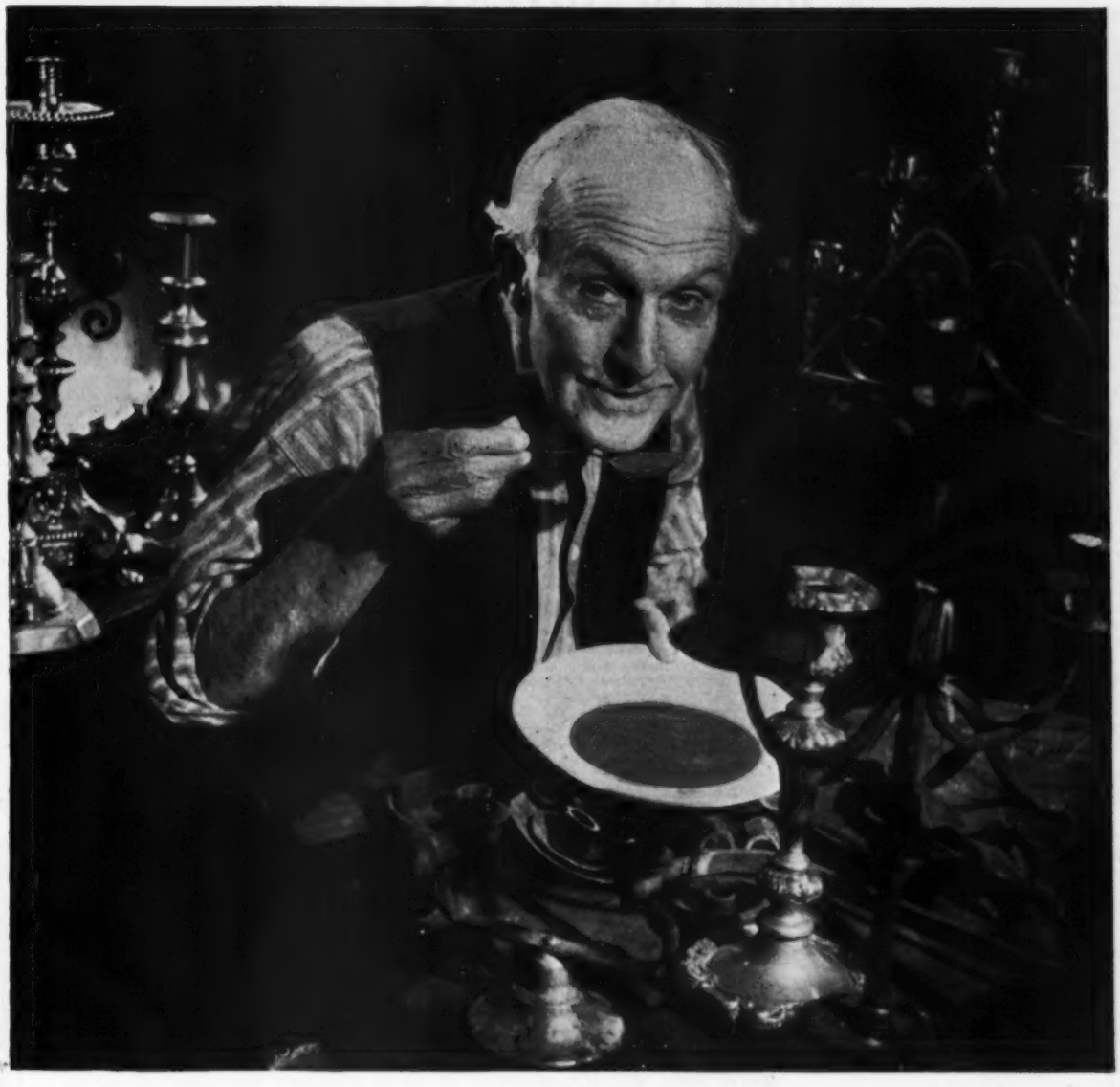
Index to ADVERTISERS

	Page
Abix (Metal Industries), Ltd.	xcii
Acalor Ltd.	lxxxvii
Advita, Ltd.	lxxxiii
Aerox, Ltd.	Dec.
Agricultural & Chemical Products, Ltd.	cxi
Air Control Installations, Ltd.	May
Air Drying & Conditioning Ltd.	May
Airguard, Ltd.	cx
Albro Fillers & Engg. Co. Ltd.	lxxxiv
Alexandra Separator Co. Ltd.	lxxiii
Alfa-Laval Co., Ltd.	cvii
Alite Machines, Ltd.	cvi
Allen, Stafford, & Sons, Ltd.	xxxiii
Allspeeds, Ltd.	April
Aluminium Union Ltd.,	Feb.
Angel Warehouse Co., Ltd.	cxi
Anhydro, A/S	May
A.P.V. Co., Ltd.	April
Arabol Mnfg. Co., Ltd.	April
Associated Metal Works, Ltd.	May
Associated Television Ltd.	May
Bakers' & Confectioners' Exhibition	Aug.
Baldwin Instrument Co., Ltd.	lxxiv
Barron, W. S., & Sons, Ltd.	cxiv
Bayer Products, Ltd.	May
Bear Honey Co., Ltd.	May
Beddington Nut & Product Co. ,Ltd.	cx
Begg, Cousland & Co., Ltd.	cii
Behr, S., & Mathew Ltd.	Jan.
Bellingham & Stanley, Ltd.	cx
Benjamin Electric, Ltd.	lxix
Bennett Sons & Shears, Ltd.	xcv
Berite, Ltd.	Feb.
Betts & Co., Ltd.	lxxxviii
Birmingham Chemical Co., Ltd.	Aug.
Blakesley, D. F., & Co.	xcviii
Blaw Knox, Ltd.	Jan.
Bliss, E. W., (England), Ltd.	xxix
Boehm, Fredk., Ltd.	vi, xl
Bowaters Sales Co., Ltd.	I, li
Braby, Fredk., & Co., Ltd.	viii
Bramigk & Co., Ltd.	lii
Bramwell, S., & Co., Ltd.	lxxvi
Brierley, Wm., Collier & Hartley, Ltd.	lxxxvi
British Belting & Asbestos, Ltd.	May
British Brehmer, Ltd.	May
British Ceca Co., Ltd., The	xcviii
British Celanese, Ltd.	liii
British Cellophane, Ltd.	xxv
British Electrical Development Association	lx
British Hydrological Corporation	May
British Food Fair	July
British Industries Fair	Oct.
British Jeffrey-Diamond, Ltd.	Nov.
British Rayophane, Ltd.	cix
British Road Services, Ltd.	lxvi
British Sidac Ltd.	xliii
British Soya Products Ltd.	Oct.
British Steam Specialities, Ltd.	Jan.
British Thomson-Houston Co., (Rugby)	May.
British Visqueen, Ltd.	April
British Wedge Wire Co., Ltd.	April
Broadbent, Thomas, & Sons, Ltd.	May
Brook Motors, Ltd.	May
Brown & Forth, Ltd.	May
Brown & Polson, Ltd.	May
Bryan, Wm., Ltd.	lxxxviii
Bush, W. J., & Co., Ltd.	c
Butterfield, W. P., Ltd.	xv
Caleb Duckworth, Ltd.	May
Calfos, Ltd.	May
Cambitzi, G., & Co., Ltd.	Mar.
Cambridge Instrument Co., Ltd.	May
Canning Town Glass Works, Ltd.	cxiv
Carbic, Ltd.	April
Cashmore, John, Ltd.	cx
Cellulose Development Corpn., Ltd.	Jan.
Chamberlain & Willows	Dec.
Chambon, Ltd.	Mar.
Cinema-Television, Ltd.	Dec.
Clarke-Built, Ltd.	May
Clark, George, & Co., Ltd.	Cover i
Clark, T. & C., Ltd.	xc
Clemens & Vogl	July
Coates Bros. Inks, Ltd.	May
Cohen, George, Sons & Co., Ltd.	cxiii
Collets Bookshop, Ltd.	Nov.
Colt Ventilation, Ltd.	xviii
Comm. Giordano Tomellari	May
Commer Cars, Ltd.	lix
Compressed Paper Packing Ltd.	cvii
Confectioners' Vegetables Colour & Fruit Essences Co., Ltd.	cvi
Coniston Co.	Feb.
Cooper, McDougall & Robertson, Ltd.	ix
Corn Products Co., Ltd.	May
C.P. Equipment, Ltd.	xxiv
Craigmillar & British Creameries, Ltd.	xlv
Crofts (Engineers), Ltd.	lvi
Crompton Parkinson, Ltd.	May
Crookes Laboratories, Ltd.	xc
Cuxson Gerrard & Co., Ltd.	cvi
Dale, John, Ltd.	Mar.
Dalmas Ltd.	lxxxvi
Danks, Edwin, & Co., Ltd.	xvii
Davey, Paxman, & Co., Ltd.	April
Dawson Bros., Ltd.	May
Demby, Hamilton & Co., Ltd.	May
Denton Edwards Paints, Ltd.	lxxxix
Dewey & Almy, Ltd.	xcv
Dickinson, John, & Co., Ltd.	Dec.
D.M.P. Sales, Ltd.	May
Dodge Bros., (Britain), Ltd.	May
Dodman, Alfred, & Co., Ltd.	April
Drakesons	cxi
Drayton Regulator & Instrument Co.	xxxvii
Duche, T. M., & Sons, Ltd.	xciv
Duche & Knight, Ltd.	May
E.C.D. Co., Ltd.	ciii
Edwards, F. J., Ltd.	Sept.
Eimco (Gt. Britain), Ltd.	lxi
Electropower Gears, Ltd.	ci
Electrothermal Engg. Co. Ltd.	April
Electrolux, Ltd.	xi
English Electric Co., Ltd.	lxii
English Grains Co., Ltd.	civ
Escher Wyss Ltd.	lxxvi
Evan Cook's Packer, Ltd.	Oct.
Evans, L. E.	c
Evans, Wm., Co., Ltd.	xlix
Everitt & Co., Ltd.	Oct.
Fabbrica Macchine Industriali	ci
Factory Equipment Exhibition	Mar.
Fatoils, Ltd.	cviii
Feaver, John, Ltd.	Feb.
Felber Jucker, & Co., Ltd.	cix
Fenner, J. H., & Co., Ltd.	xxvii
Findus, Ltd.	Dec.
Fisher's Foils, Ltd.	xlvi
Fison, Edward, Ltd.	xxii
Fisons Milk Products, Ltd.	v
Flexible Packaging, Ltd.	May
Flexibox, Ltd.	May
Flexile Metal Co., Ltd.	April
Foodtech, Ltd.	iii
Foster Instrument Co., Ltd.	April
Fox, Samuel, & Co., Ltd.	xix
Fraser, J., & Son, Ltd.	May
Fuller Horsey, Sons & Cassell	cx
Gardner, Wm., & Sons, (Glos.), Ltd.	May
Garvin, L., & Co., Ltd.	May
Gas Council	lxiv, lxv
Gee Manufacturing Co., Ltd.	Dec.
General Electric Co., Ltd.	xxxi
General Engineering Co. (Radcliffe), Ltd.	Feb.
Giusti, T. & Son, Ltd.	April
Gloy & Empire Adhesives, Ltd.	Sept.
Gordon, A. G.	Jan.
Goring Kerr, Ltd.	July
Gosheron, John, & Co., Ltd.	xciii
Greening, N., & Sons, Ltd.	May
Grew, James, & Co., Ltd.	Dec.
Gunson, R. W., (Seeds), Ltd.	May
G. W. B. Furnaces, Ltd.	Dec.
Hacoma, Ltd.	Jan.
Haller & Phillips, Ltd.	Dec.
Hamburger, M., & Sons	c
Hanover Fair	Mar.
Hanovia, Ltd.	May
Hansella Machinery & Packaging ,Ltd.	Aug.
Hardaker, John T., Ltd.	Mar.
Harradine, J., & Sons, Ltd.	Feb.
Harvey, G. A., Ltd.	lxxxix
Havinder, G., Ltd.	Cover i
Hawker & Co.	May
Heston Equipment Co., Ltd.	Cover iii
Hill Engg. Co. (Hull) Ltd., The Thomas	May
Hogg, Thos.,	Nov.
Holden & Brooke, Ltd.	Sept.
Holland, W. L., Ltd.	Jan.
Honeywell-Brown, Ltd.	vii
Honeywill & Stein Ltd.	xciii
Hopkinsons, Ltd.	May
Howard Pneumatic Engg. Co., Ltd.	xciv
Howards (Colney), Ltd.	Nov.
Howards of Ilford, Ltd.	Dec.
Hunt, John, (Bolton), Ltd.	xcvii
Hunt Partners, Ltd.	Feb.
Imperial Chemical Industries Ltd.	x, xxvi, liv
Incinerator Co., Ltd.	May
International Combustion, Ltd.	xlvii
Isopad, Ltd.	Mar.
Ivor Power Speciality Co., Ltd.	Mar.
Jackson, J. G., & Crockatt Co., Ltd.	c
Jackson Henry (Liverpool), Ltd.	May
Jenkins, Robert, & Co., Ltd.	May
Jenner, A. & C., Ltd.	May
Job Day & Sons, Ltd.	Feb.
Johnson, A., & Co., (London), Ltd.	May
Jones Cranes	Nov.
Jones, Samue', & Co., Ltd.	Jan.
J. & R. (Butchers) Suppliers, Ltd.	cii
Kane, Frederick C.	Feb.
Kek, Ltd.	lxxii
Kellie, R., & Son,Ltd.	lxiii
Kemball, Bishop & Co., Ltd.	May
Kemp, Frank, Ltd.	Nov.
Kestner Evaporator & Engg. Co. Ltd.	May
Kimpton Bros., Ltd.	xxxiv
Kleenkut Bindings Co., Ltd.	Dec.
Kneeda Mnfg. Co., Ltd.	Jan.
Kustner Bros., Ltd.	May
Lacy Hulbert & Co., Ltd.	xiii
Lambert, L., & Co., Ltd.	May
Lautier Fils, Ltd.	Mar.
Leiner, P., & Son, Ltd.	May
Loders & Nucoline, Ltd.	lxxxii
Loma Metal Detectors, Ltd.	xci
London Oil Corporation, Ltd.	civ
Longwood Engg. Co., Ltd.	Nov.
Magnetic Valve Co., Ltd.	May
Maitlands (Metal Works), Ltd.	cviii
Mark-o-Print, Ltd.	Dec.
Marshall, A. L., (Carlton), Ltd.	Jan.
Mather & Platt, Ltd.	xxxviii
Matling, Ltd.	May
May & Baker, Ltd.	May
Measurement, Ltd.	lxvii
Mechanical Handling Exhibition	April
Medway Corrugated Paper Co., Ltd.	April
Metafiltration Co., Ltd.	May
Metal Box Co., Ltd.	Cover ii, xxi
Metal Closures, Ltd.	May
Metal Propellers, Ltd.	Mar.
Metalrax (Conveyors), Ltd.	May
Mill Products (N.Z.), Ltd.	May
Mill Cleaning Services, Ltd.	July
Mitchell Engineering, Ltd.	Feb.
Mitchell, L. A., Ltd.	xlii
Mono Pumps, Ltd.	May
Monsanto Chemicals, Ltd.	May
Morris, Herbert, Ltd.	July
Morton, Robert, & Co., Ltd.	May
Myers & Foulkes	Oct.
National Adhesives, Ltd.	Jan.
National Glass Works (York), Ltd.	cviii
National Industrial Fuel Efficiency Service	Nov.
Negretti & Zambra, Ltd.	May
Newnes, George, Ltd.	Dec.
Nipa Laboratories, Ltd.	May
Norman Engg., Co.	lxxviii
Norwood, W., & Sons, Ltd.	May
Nutregen Ltd.	lxxx
Oppenheimer Casing Co. (U.K.)	iii
Ormerod Engineers, Ltd.	May
Oxo, Ltd.	April
Packaging Exhibition	Jan.
Padley & Venables, Ltd.	lxx
Paine & Co., Ltd.	April
P.A.M., Ltd.	civ
Pascall Engineering Co., Ltd.	Nov.
Passburg-Block-Hass, G.m.b.H.	Feb.
Payne, P. P., & Sons, Ltd.	Jan.
Peerless & Ericsson	Jan.
Permoglaze, Ltd.	May



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Index to ADVERTISERS

	Page
Permutit Co., Ltd.	xx
Peters, G. D., Ltd.	xcix
Philips Electrical, Ltd.	Nov.
Pilkington Bros., Ltd.	May
Plenty & Son, Ltd.	civ
Polak & Schwarz, Ltd.	May
Pollard Bearings, Ltd.	Dec.
Porteus, G., & Sons, Ltd.	xcii
Potter, F. W., & Soar, Ltd.	cviii
Powell & Co.	Mar.
Powell Duffryn Carbon Products ,Ltd.	Mar.
Power Jacks, Ltd.	Sept.
Premier Filterpress Co., Ltd.	cvi
Pressoturn, Ltd.	May
Pulsometer Engg. Co., Ltd.	cxiv
Purdy Machinery Co., Ltd.	ciii
Pyrok, C. & T., Contracts, Ltd.	Jan.
Quickset Water Sealers, Ltd.	Oct.
Ransomes, Sims & Jeffries, Ltd.	Feb.
Rapid Magnetic Machines, Ltd.	June
Rayner & Co., Ltd.	May
Reads Ltd.	xiv
Realm Engineering Works, Ltd.	Mar.
Redler Conveyors, Ltd.	May
Reed Corrugated Cases Ltd.	lviii
Remploy, Ltd.	xci
Renold Chains Ltd.,	xxxv
Revai, A., & Co. (Chemicals), Ltd.	April
Roche Products, Ltd.	May
Rose, Downs & Thompson, Ltd.	lxxiv
Rowe Bros., & Co., Ltd.	June
Ruislip Distributing, Co., Ltd.	May
Samuelson, P., & Co., Ltd.	May
Sanders, H. G., & Son, Ltd.	xlviii
Sandvik Steel Band Conveyors, Ltd.	May
Saunders Valve Co., Ltd.	May
Sauven Perforating Machine Co.	xcviii
Saxon Engg. Co., Ltd.	Nov.
Scherer, R. P., Ltd.	Aug.
Schimmel Boehm, Ltd.	vi
Sculthorp, R., & Co., Ltd.	July
Semtex, Ltd.	xxxvi
Seyfried, John F., & Sons, Ltd.	Nov.
S.F.P. (Food Products), Ltd.	Mar.
Shell Chemical Co., Ltd.	lxxix
SIG Wrapping Machines, Ltd.	April
Silber, L. I., & Co., Ltd.	Oct.
Simon, Henry, Ltd.	lxxxvii
Skerman, C., & Co., Ltd.	cxiii
SMALL ADVERTISEMENTS	cxi-cxiii
Small Electric Motors, Ltd.	May
Smith & McLaurin, Ltd.	lvii
Sorenson, John R., & Co., Ltd.	cix
Soya Foods, Ltd.	Feb.
Spencer-Bonecourt-Clarkson, Ltd.	xcvii
Spirax-Sarco, Ltd.	Dec.
Spring Grove Laundries, Ltd.	July
Stacey, Frank, & Co., Ltd.	cx
Star Welding, Ltd.	lxxxv
Steel Co., of Wales Ltd.	xxx
Stelcon (Industrial Floors), Ltd	May
Stevenson & Howell, Ltd.	May
Stokes & Dalton, Ltd.	Nov.
Stone, J. & Co. (Deptford), Ltd.	Mar.
Sturge, J. & E., Ltd.	xxxix
Sturtevant Engineering Co., Ltd.	Dec.
Sunvic Controls, Ltd.	lxxvii
Swift & Swallow, Ltd.	Dec.
Talbot Stead Tube Co., Ltd.	Jan.
Tate Bros.	Aug.
Taylor Rustless Fittings Co., Ltd.	May
Taylor-Short & Mason, Ltd.	Feb.
Teleflex Products, Ltd.	Mar.
Telegraph Construction & Maintenance Co., Ltd.	Dec.
Thames Board Mills, Ltd.	May
Thomas, W. K., & Co.,	April
Thomas, Richard & Baldwins, Ltd.	Feb.
Thompson, John, (Dudley), Ltd.	Nov.
Tilghman's, Ltd.	cv
Toplis Simpson, & Co., Ltd.	xcix
Transparent Paper, Ltd.	Feb.
Trapow, D., & Co., Ltd.	Feb.
T.S. (Office Equipment), Ltd.	April
Tunnel Glucose Refineries, Ltd.	Jan.
Union Food Machinery Co., Ltd.	May
United Glass Bottle Manfrs., Ltd.	xliv, Cover iv
United Indigo & Chemical Co., Ltd.	May
United Steel Companies, Ltd.	xix
United Wire Works, Ltd.	lxxxv
Universal Metal Products, Ltd.	lxxv
Valley Products (Lye), Ltd.	Aug.
Valrecchio, s.p.a.	May
Venesta, Ltd.	xxiii
Vickerys, Ltd.	cii
Visco Engg., Co., Ltd.	cv
Viscose Development Co., Ltd.	lv
Viskase, Ltd.	xvi
WAECO, Ltd. (Fumite Division)	cxiv
Walker, Crosweller & Co., Ltd.	Mar.
Warwick Production Co., Ltd.	xli
Washington Chemical Co., Ltd.	Nov.
Watson, R. N., Ltd.	Sept.
Webster, Isaac, & Sons, Ltd.	May
Weir, G. & J., Ltd.	xii
Wetter, J. C., & Co., Ltd.	May
Whiffen & Sons, Ltd.	April
White, Tomkins & Courage, Ltd.	April
Whittaker, Arthur	cxi
Willcox, W. H., & Co., Ltd.	xxviii
Williams (Hounslow), Ltd.	xcvi
Wingrove & Rogers, Ltd.	April
Yale & Towne, Ltd.	lxxxi
York Shipley, Ltd.	lxxi
Yorkshire Engineering & Welding Co., Ltd.	May
Youngman, W. C., Ltd.	xxxii
Zephyr Engineers, Ltd.	cii

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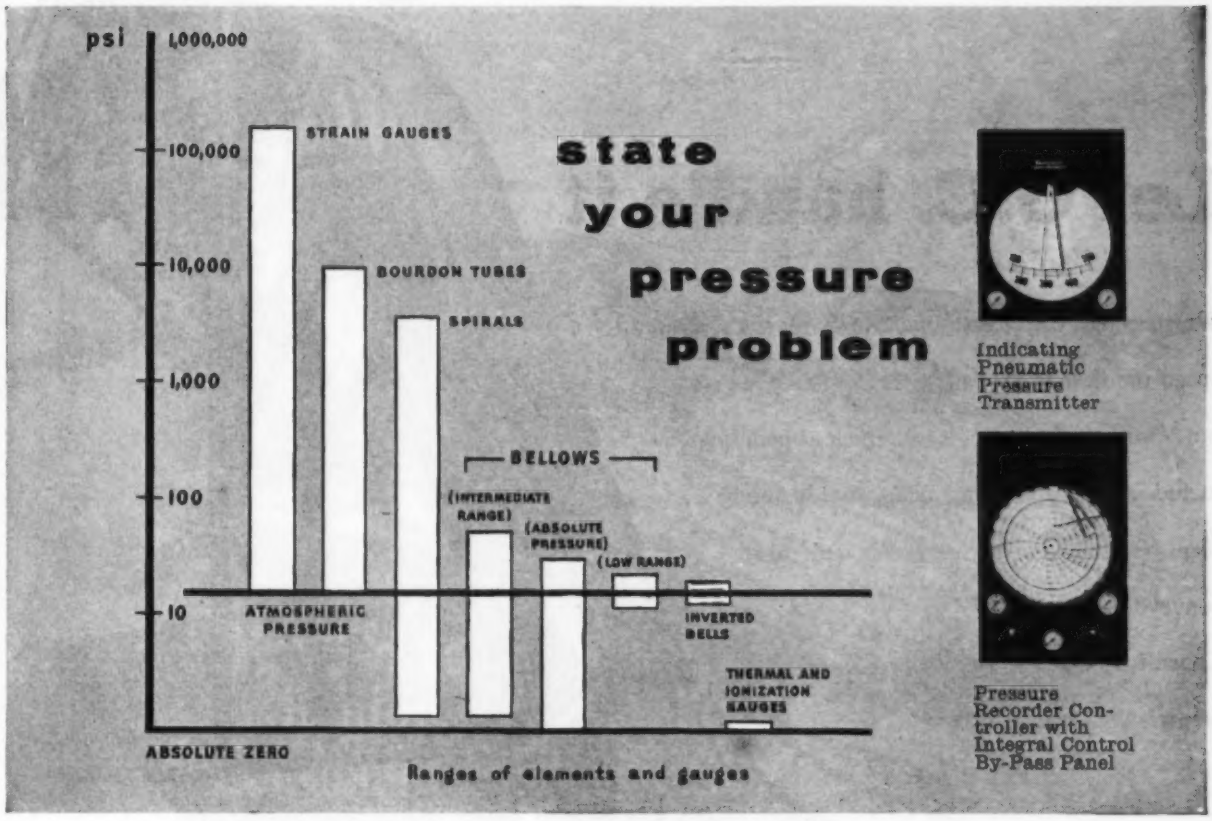

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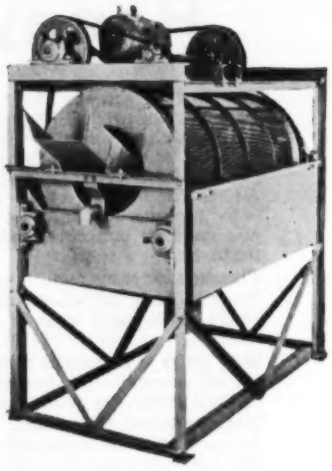

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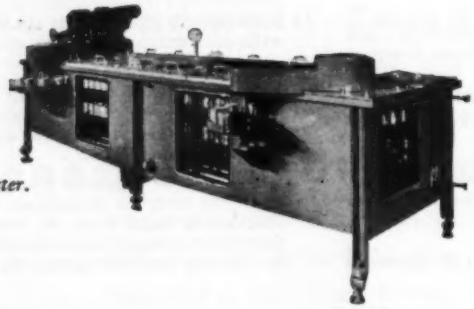

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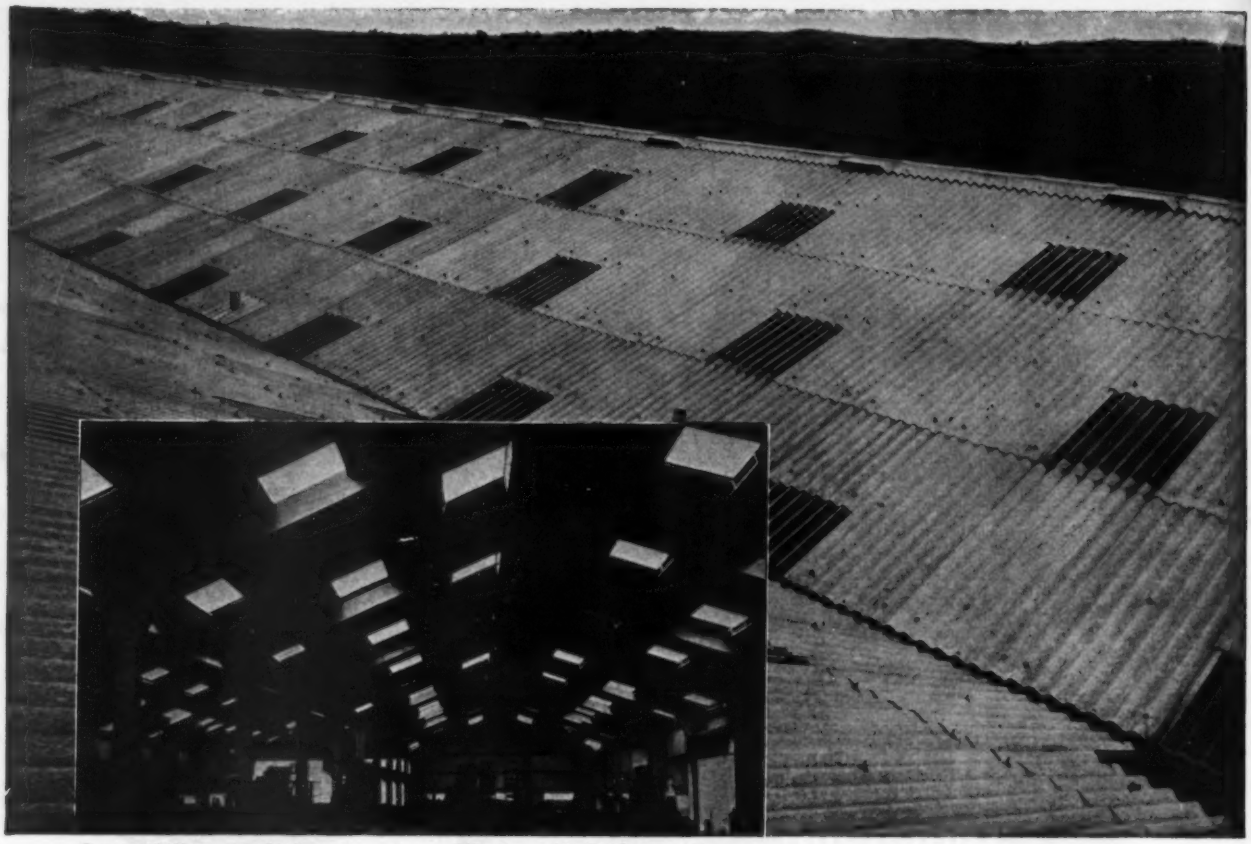

Corrugated 'Perspex' roof lights in the new factory of The Square Grip Reinforcement Company (Bristol) Ltd. The architect is A. E. Powell, A.R.I.B.A., A.I. Struct. Eng. Roofing—W. R. Davey & Sons.

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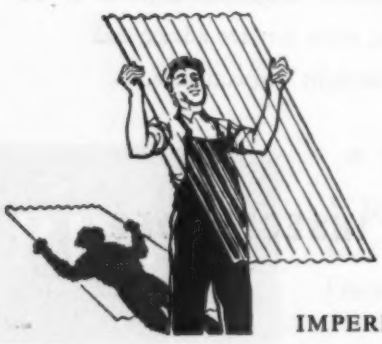

It's as clear as daylight—

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TGH/OB.

27th May, 1955.

Contracts Manager,
Electrolux Ltd.,
Regent Street,
LONDON, W.1.

Dear Sir,

We have now had your Laundry Equipment at our factory for the past four months, and its installation has greatly contributed to the maintenance of a high standard of cleanliness. It enables the speedy and efficient laundering of overalls, etc., and we are pleased to inform you that it has been most satisfactory in all respects. We would also express our appreciation ofthe helpful advice and training which you gave to our operators of this equipment.

Yours faithfully,
p.p. CLIFFS FOOD PRODUCTS LTD.

J. G. Blackman

Secretary.

Electrolux
LAUNDRY EQUIPMENT
washes "on the spot"

Electrolux Laundry Equipment — installed by Cliffs Food Products Ltd., Liverpool, is used for washing all factory garments — overalls, coats, aprons, caps and also boiler suits for maintenance staff etc. To provide a daily change of garments for about 120 personnel approx. 600 overalls, 400 aprons and 500 caps are washed weekly *on the spot*.

Electrolux Laundry Equipment (Washing Machine, Hydro-Extractor, Laundry Truck):

- provides a high temperature wash — at boiling-point if necessary.
- reduces handling.
- saves delay in turn-round of laundry.

Washing Machine handles 22 lb. dry weight in *one* operation. Heats its own water — by gas, electricity or steam. No additional water-heating plant needed.

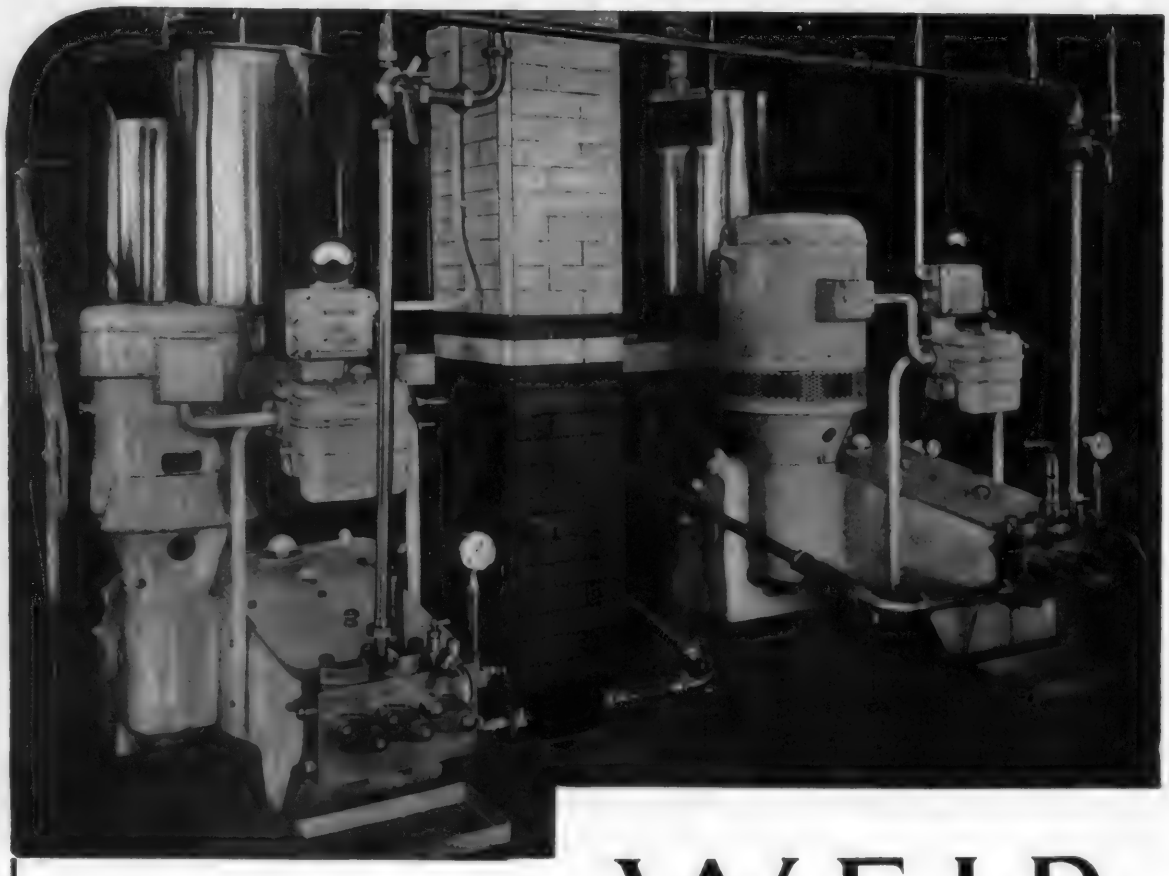
Hydro-Extractor: capacity of 14½ lb. dry cloth weight. Greatly simplifies drying of clothes — removes most of the water in five minutes.

Laundry Truck: capacity 53 gallons. For soaking and transporting laundry from Washing Machine to Hydro-Extractor.

Electrolux Laundry Equipment is designed for heavy duty and long life . . . it is a sound investment.

For full details of the Electrolux Laundry Planning Service write to:

ELECTROLUX LTD. (Contracts Dept. G), 153/5 Regent Street, London, W.1. Telephone: REGent 7252



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Homogenisers

produce perfect emulsions and mixtures, improving taste, richness, and keeping qualities, and enhancing the appearance and appeal to the public. Milk, creams, pastes, etc., when homogenised retain extremely stable emulsion, unaffected by changes in temperature, and will not separate when left untouched for long periods. Weir Homogenisers leave no metallic taint and working parts are of stainless steel.

MODELS IN STANDARD SIZES WITH CAPACITIES BETWEEN 10 and 1,250 GALS. PER HOUR

Write for Publications Nos.
ID. 133 (for small size) or
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For vacuum testing, de-aeration prior to impregnation, distillation of fluids, pre-storage drying, evaporation of water or other solvents.

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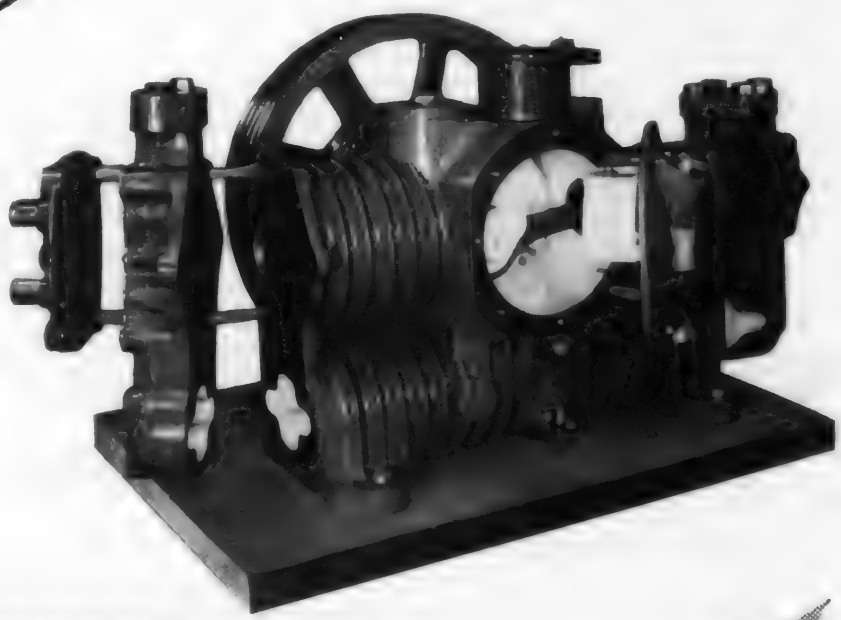
The CXB is a two-stage air-cooled dry vacuum pump capable of maintaining for long periods a vacuum of better than 29½" Hg. Leaflet CXB3.



As specialists in the design, manufacture and performance of air compressors and vacuum pumps, Lacy-Hulbert can help with your problems of application and installation —and supply individual accessories or a complete plant.

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BOREAS WORKS · BEDDINGTON CROYDON
PNEUMATIC ENGINEERS — ESTABLISHED 1901

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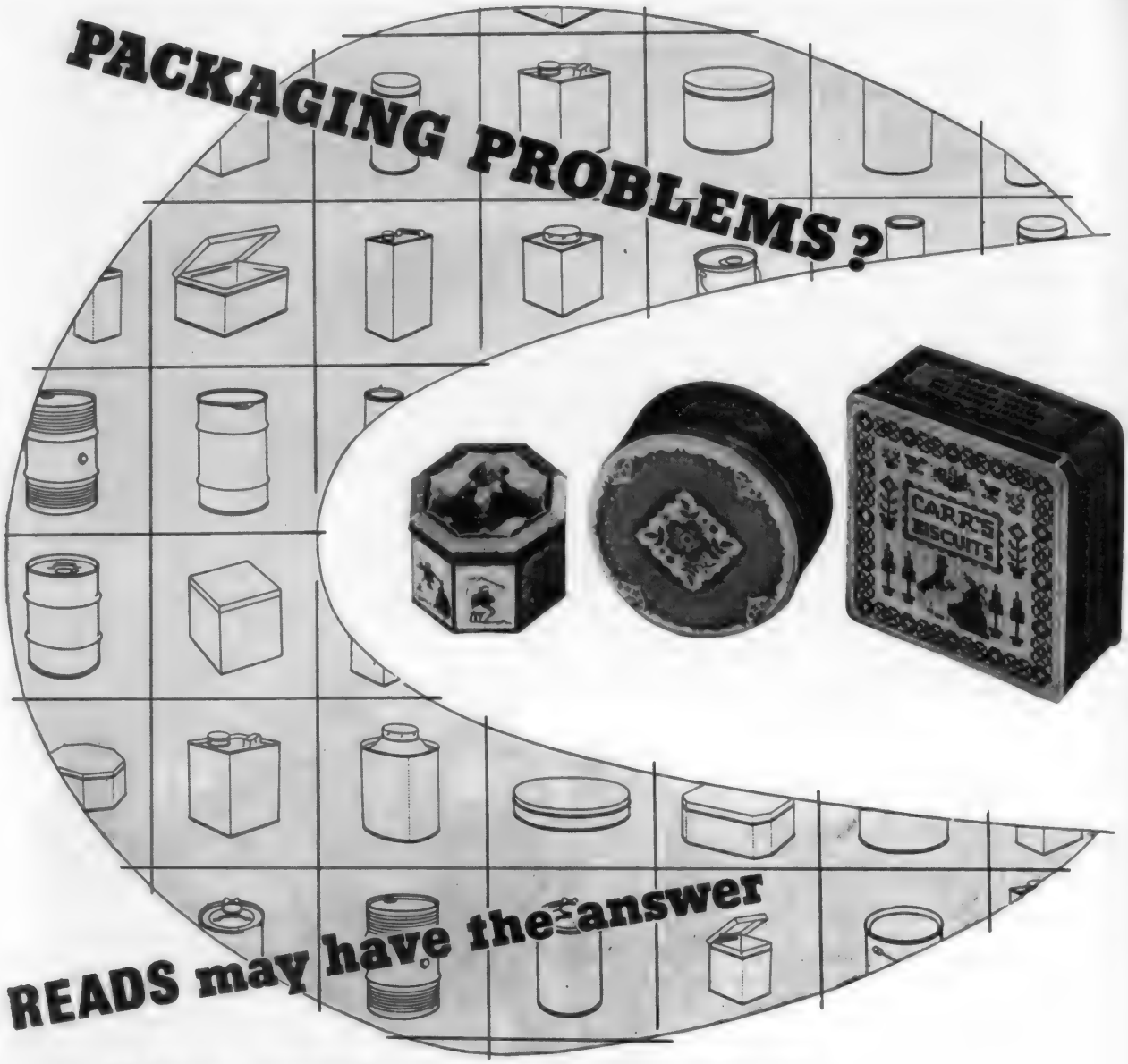
they have the pneumatic 'know-how'!



...if it's a question of metal containers

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OF LIVERPOOL

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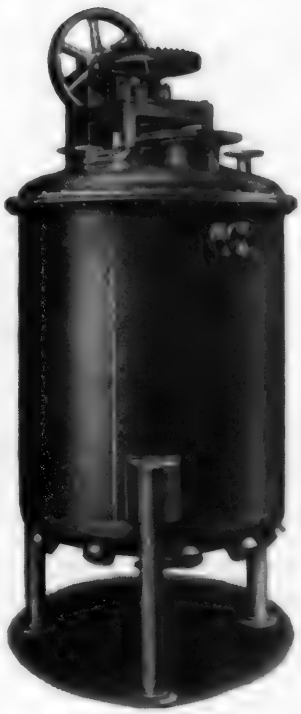

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Butterfield
STAINLESS STEEL
EQUIPMENT

Butterfield craftsmen produce Stainless Steel Equipment to the specification of Plant Engineers, to tally with an ever-expanding list of industrial needs.

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SPECIAL VESSELS

FOR EVERY INDUSTRIAL PROCESS

including:

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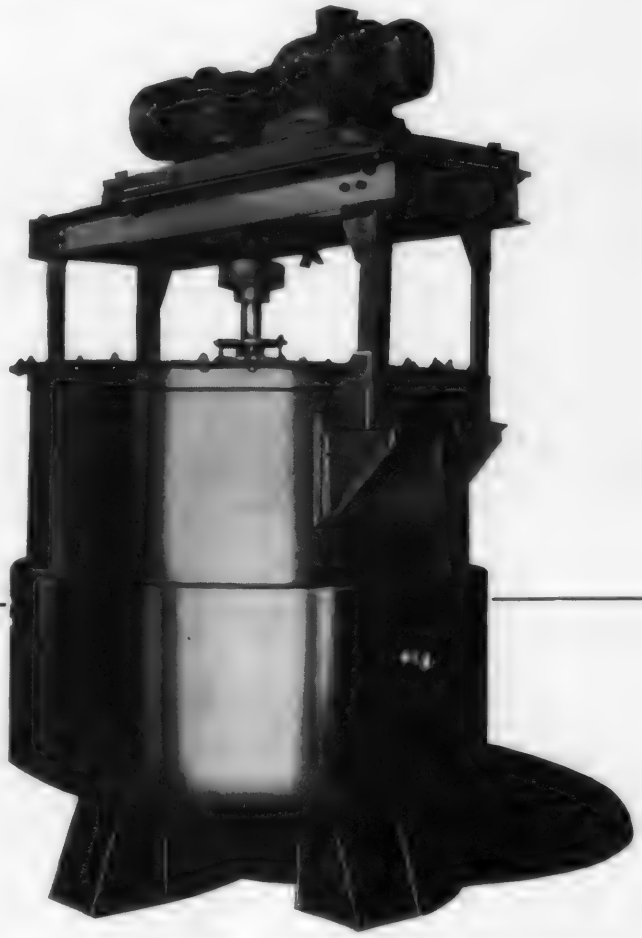

The illustration shows a Steam Jacketed Mixing Pan 4′ 6″ diameter by 5′ 0″ deep, fitted with stirrer gear operated by electric motor and reduction gear. This type of mixing pan can be made in any size to satisfy special requirements and working conditions. Vessels of the same design are supplied with or without steam jacket, or, alternatively, fitted with internal steam coils.

Manufactured in mild steel, stainless steel or mild steel with integrally clad material of stainless steel or monel.

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JACOB'S (L'POOL) LTD.

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Five Colt Inflow Units were recommended as these would supply the inlet air necessary whilst at the same time the main cooling effects of the air movement provided would off-set the discomfort caused by radiant heat.
This is the most recent of nine separate Colt Ventilation contracts so far completed for this company, all of which have been highly satisfactory.

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"SILVER FOX" . . . *the metal of the age*

Registered Trade Marks

STAINLESS STEEL

In the galleys of modern ocean going vessels stainless steel equipment is an inevitable choice. Its smooth surfaces can easily be kept scrupulously clean merely with soap and water, and its hard wearing qualities offer hygiene in every form of catering. Stainless steel is thoroughly practical and will last a lifetime.

Galley of the s.s. "Iberia" manufactured by Henry Wilson and Company of Liverpool, and photographed in natural colour by kind permission of the P. & O. Steamship Company Limited.

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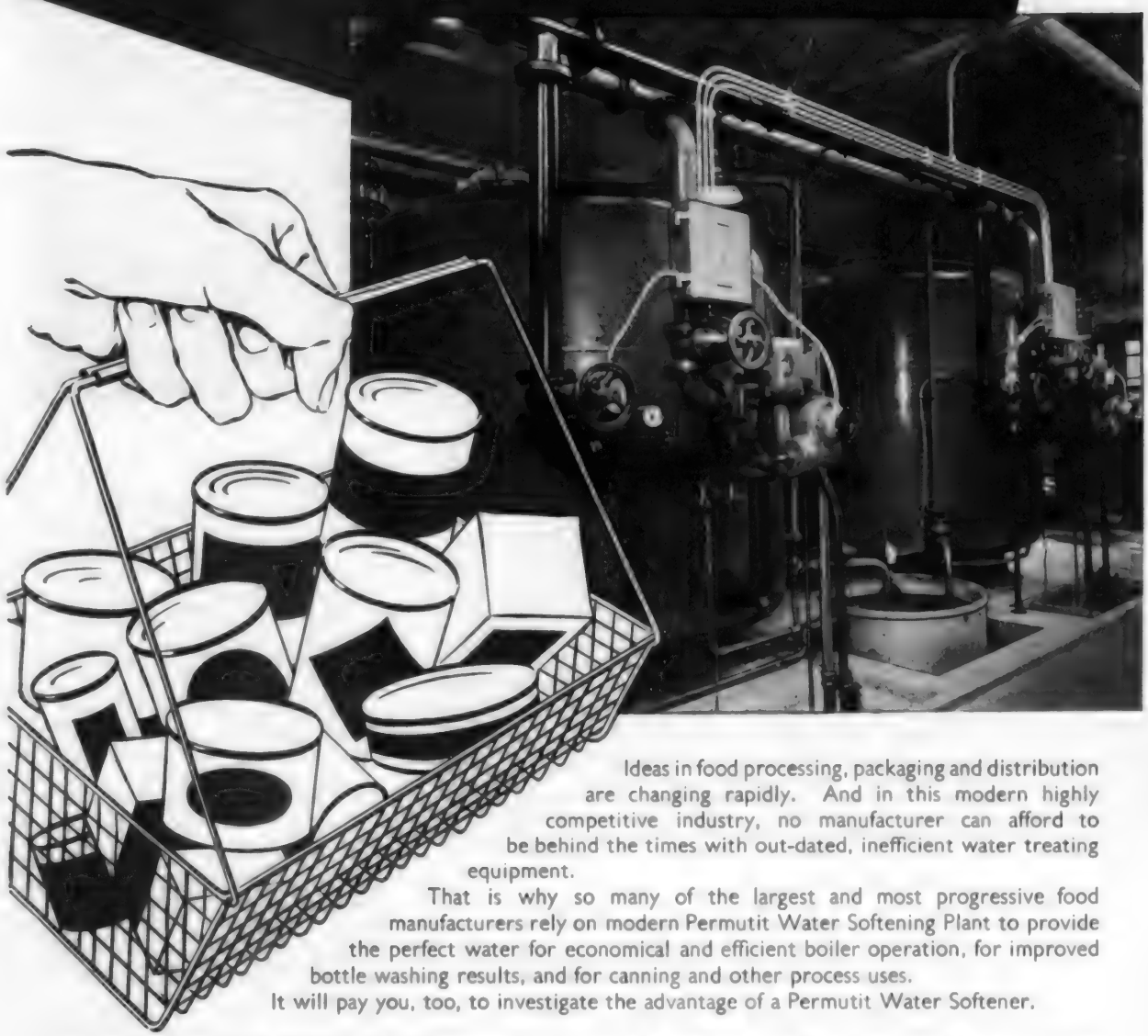
WATER TREATING PLANT SERVES THE MODERN FOOD INDUSTRY



Ideas in food processing, packaging and distribution are changing rapidly. And in this modern highly competitive industry, no manufacturer can afford to be behind the times with out-dated, inefficient water treating equipment.

That is why so many of the largest and most progressive food manufacturers rely on modern Permutit Water Softening Plant to provide the perfect water for economical and efficient boiler operation, for improved bottle washing results, and for canning and other process uses.

It will pay you, too, to investigate the advantage of a Permutit Water Softener.

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Designed to promote sales
of confectionery both
at home and overseas these
highly decorated metal containers
have the following advantages:

- ★ **Exclusive decoration**
- ★ **Suitability for the product**
- ★ **Variety of shapes**
- ★ **Variety of closures**
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- ★ **Superb printing**

THE METAL BOX COMPANY LIMITED

Metal Containers Paper Products · Flexible Packages
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MALT PRODUCTS

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DRIED MALT EXTRACT POWDER

MALT FLOUR

An ever-increasing application to food industries

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FACTORY CEDARS STOWMARKET SUFFOLK

Maltsters for more than a Century

– consistently good

VENESTA TUBES

put your products in the picture

VENESTA LIMITED *Packaging Division*, Vintry House, Queen Street Place, London, E.C.4. *CENtral 3040*

C.P. Patented Plate Heat Exchangers have entirely flat crevice-free plates and separate synthetic seals, providing the easiest possible method of cleaning.

The special plate arrangement developed by The C.P. Equipment Ltd. enables these Plate Heat Exchangers to run for very long periods without the necessity of opening, even when products have a large degree of solids.

Equally suitable for Cooling, Heating, or Full Pasteurising duty.

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Formerly The Creamery Package Mfg. Co. Ltd.

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Telephone MITcham 2981 (4 lines) *Telegrams* "Swepyko, Mitcham"

THESE ARE YOURS

Every day, sales and technical representatives from British Cellophane Limited are giving a range of services which help "Cellophane" film users immeasurably in the task of preserving, displaying and selling their products.

HELP FROM B.C.L. FOUR invaluable services....

1. **PACKAGING AND MERCHANDISING ADVICE** *from B.C.L. representatives. They know transparent films inside out—how they can best be used, what they will do for your product.*

2. **TECHNICAL AID** *with packaging machinery from the Service Engineers. They have at their finger-tips up-to-the-minute knowledge of wrapping machines. They can smooth out your technical troubles.*

3. **SCIENTIFIC ASSISTANCE** *from the staff of the Research and Development Division. They work to improve existing films, to develop new ones, to find answers to film-users' queries.*

4. **PACKAGE DESIGN HELP** *from artists and designers. They are specialists in creating attractive packages for all kinds of products, however awkward their shape and size.*

THESE SERVICES ARE FREELY AT YOUR DISPOSAL—WITHOUT OBLIGATION

HIGH-QUALITY CONVERSION

High-quality colour printing and bag-making for "Cellophane" film users are an integral part of the B.C.L. SERVICE.
COLODENSE LIMITED, *exponents of film printing and converting techniques, are now a wholly-owned associate of British Cellophane Limited.*

"CELLOPHANE" — the first packaging film — and the greatest!

BRITISH CELLOPHANE LIMITED

Commercial Offices: 12/13, CONDUIT STREET, LONDON W.1
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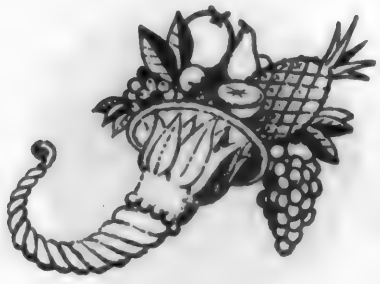
"Cellophane" is the registered trade mark of British Cellophane Limited and denotes the brand of cellulose film manufactured by them



Vantoc AL

A reliable steriliser

Vantoc AL is of interest to all manufacturers of soft drinks. It is a surface-active quaternary ammonium bactericide. It penetrates and destroys infection in mixing pans, syrupers, pipe lines, fillers and bottle stoppers. Its solutions, which may be applied hot or cold, are odourless, non-corrosive, non-toxic and safe to handle. Vantoc AL is highly effective against yeasts and a wide range of bacteria at the concentrations recommended.

Write for 'Surface Active Agents Leaflets' No. 6 and No. 22.

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Heavy duty quarry conveyor.

Torque-Arm

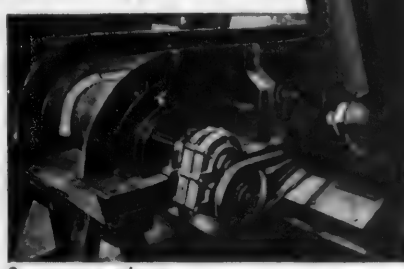
SPEED REDUCERS

TWO NEW SIZES

TO 30 H.P.

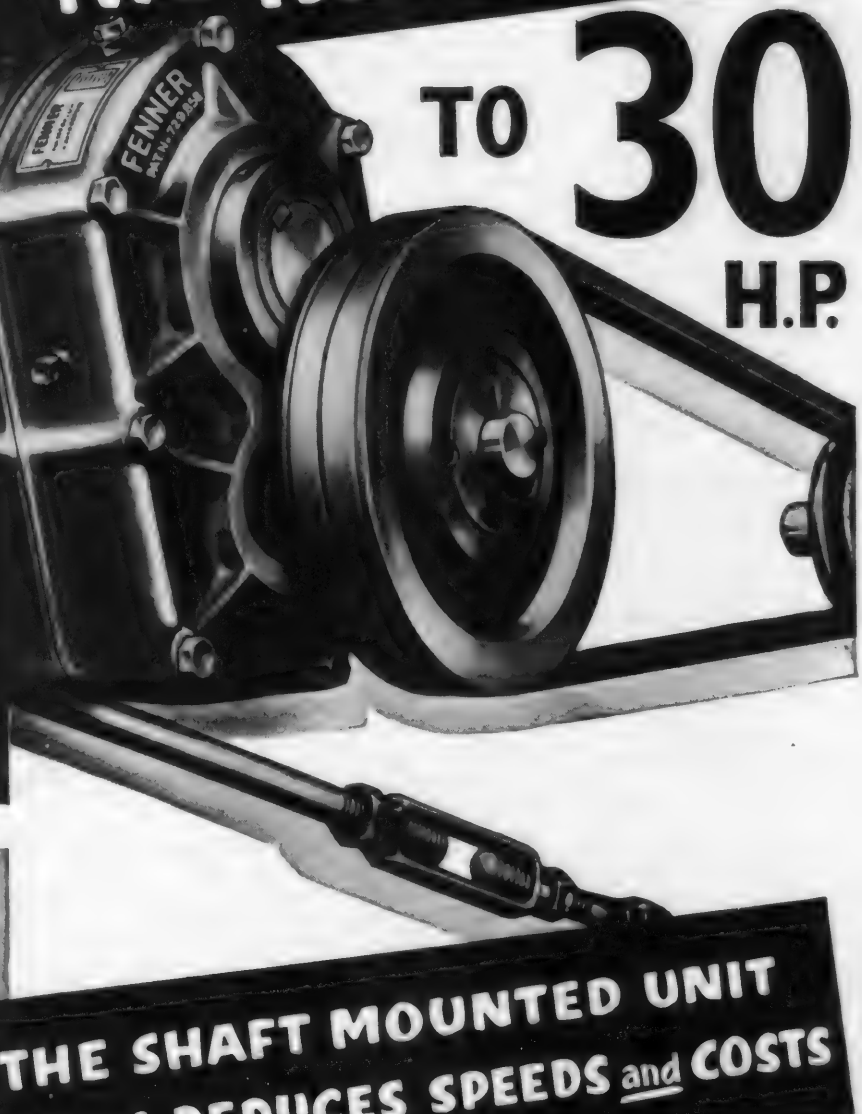
Paint and ink mixer.

Chain conveyor.



Quarrying plant.

Back stop to prevent reversal of direction.



THE SHAFT MOUNTED UNIT WHICH REDUCES SPEEDS and COSTS

SIMPLE TO INSTALL
Cuts out foundations, baseplate, couplings and difficulties of accurate alignment.

LIGHT IN WEIGHT
Soundly constructed, but light in weight, obviating excessive load on the driven shaft and bearings.

READILY AVAILABLE
In stock at all the 18 Fenner Branches.

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THE LARGEST MANUFACTURERS OF V-BELT DRIVES IN THE COMMONWEALTH

—for QUICK deliveries of all

ENGINEERING SUPPLIES

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25 lines

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W. H. WILLCOX & CO. LTD
SOUTHWARK STREET, LONDON, S.E.1

ONE *inexperienced attendant working with this*

BLISS HIGH-SPEED DOUBLE SEAMER WILL PRODUCE 80 to 120 SQUARE OR IRREGULAR-SHAPED CANS PER MINUTE!

All the attendant has to do is feed the can ends into the magazine. The Bliss High-speed Double Seamer does the rest—

- Can ends are fed to the seamer *automatically*.
- End feed is positively foolproof; only one end can be fed at a time; if end is not right side up, it is rejected *automatically*.
- If no cover is fed, no can is fed. If cover is fed but no can, cover is used on next cycle. This is completely automatic; no one need watch the work.
- The Seamer uses ends with *straight* flanges, eliminating the need for use, unless preferred, of more costly ends with started or curled flanges
- Seaming heads are available with either "clover leaf" seaming rolls or with specially-designed round rolls and developed cams.

Yes, everything about the Bliss Double Seamer has been designed for simple, automatic operation. What's more the seamer has been built for lasting performance with a modicum of maintenance: the rigid base and body structure . . . heavy-duty shafts, bushings and bearings mean years of trouble-free operation.

If you want dependable high-speed seaming, contact Bliss for complete details on this most modern double seamer.

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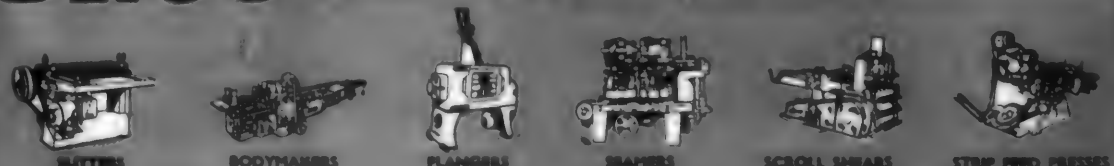
BLISS on your machine is more than a name . . . *it's a guarantee!*

BLISS CAN AND CONTAINER MAKING MACHINERY



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The Steel Company of Wales Limited

Steel sheet and tinplate of the highest quality

ENQUIRIES SHOULD BE ADDRESSED TO

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The Steel Company of Wales Ltd
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Built to last!

G.E.C. MOTORS

STANDARDISED DIMENSIONS TO B.S. 2083 (1954)

AVAILABLE FROM STOCK

TOTALLY ENCLOSED FAN COOLED

END WINDINGS TAPED TO GIVE INTER-PHASE INSULATION AND RIGIDITY

SIX LEADS BROUGHT OUT TO TERMINAL BOX

OUTPUT UP TO 25 h.p.

DOUBLE IMPREGNATION

FOR NORMAL DUTY IN ANY PART OF THE WORLD

BACKED BY 50 YEARS EXPERIENCE

Ask for Technical Description No. 431

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THIS *Youngman* PALLET

IS SPECIALLY CONSTRUCTED FOR HANDLING FOOD

The correct choice of pallet can mean considerable saving both in handling costs and storage space: the wrong choice can be disastrous. Would it be best made from hardwood or softwood? Should it be slatted? Reversible? Single-faced? If you're not sure of the answers, we'll be glad to help. As one of the largest pallet manufacturers in the country, with a standard range of over 50 different types, we feel sure our experience could be valuable to *you*.

For the latest news of pallets and stillages, and other materials handling equipment see our Industrial Equipment List. For your copy address Sales Dept: F/PS

W. C. YOUNGMAN LIMITED

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SPECIALITY
BISCUIT FLAVOURS
LINCOLN CREAM • COCONUT CREAM • TEA
MARIE • PETIT BEURRE • CUSTARD CREAM
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etc. etc.
We offer a complete range of speciality biscuit flavours which have been devised, as a result of our own research, to stand high temperature work. We shall be pleased to send on request whatever samples you may require for a test batch.
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WHARF ROAD · LONDON · N.1
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—the *one* name for

New Zealand Honey

Branded honey, unblended honey, from mild clover to the darker strong Manuka, colour-graded from pure white to deepest amber — all grades of honey come from New Zealand *direct to KIMPTONS*, Sole Agents in Europe for New Zealand honey. For over half a century KIMPTONS have been *the* name for honey. To-day, KIMPTONS are the largest honey importers in the United Kingdom, importing honey from all over the world and distributing honey to packers and to leading manufacturers of foods and pharmaceutical products. KIMPTONS will be pleased to supply *you*.

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ASSOCIATE MEMBERS OF THE BRITISH FOOD MANUFACTURING INDUSTRIES RESEARCH ASSOCIATION

Have you an operating or control problem? If so,

see if RENOLD chain can do it!

and cut out costly individual manufacture

The examples below are taken from our booklet, "Chain Mechanisms"

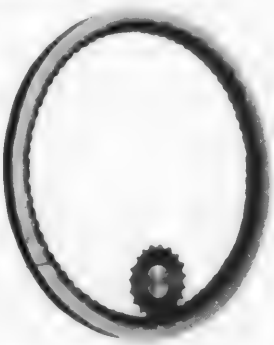
SUPPORTING

A method of supporting, suitable for round or irregular sections.

OSCILLATING-STRAIGHT-LINE MOTION

A mechanism with many applications, the example shown converting the oscillating movement of a beam into straight-line motion with a gravity return.

GEARING-INTERNAL



A convenient method of imparting rotation inside circular sections.

PURCHASE BLOCK

Roller chain, used as a purchase, results in a compact light-weight assembly as a result of its high strength-weight ratio.

Write for a copy of "Chain Mechanisms"—twenty basic ways of providing operating and control mechanisms in a cheap, efficient manner

Our engineers are always available for consultation

RENOLD CHAINS LIMITED · MANCHESTER

There's jam today, son—but . . .

To this young man, jam—especially stolen jam—is sheer heaven. And so it should be after all the worry and trouble you take to see that it's a fine jam, delivered in endless quantities. But there is always the possibility of corrosion—and if you are planning (or have already) a floor subject to the action of acid or alkali corrosives, play safe and get in touch with SEMTEX, specialists in corrosion resistance. Our technicians and trained technical staff are at your disposal, and will survey your premises and advise upon the appropriate treatments for your special problem.

Semtex

INDUSTRIAL DIVISION

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As well as being Specialists in Industrial Anti-corrosion Treatments Semtex, a Dunlop Company, design, make, lay and maintain floors for every purpose.

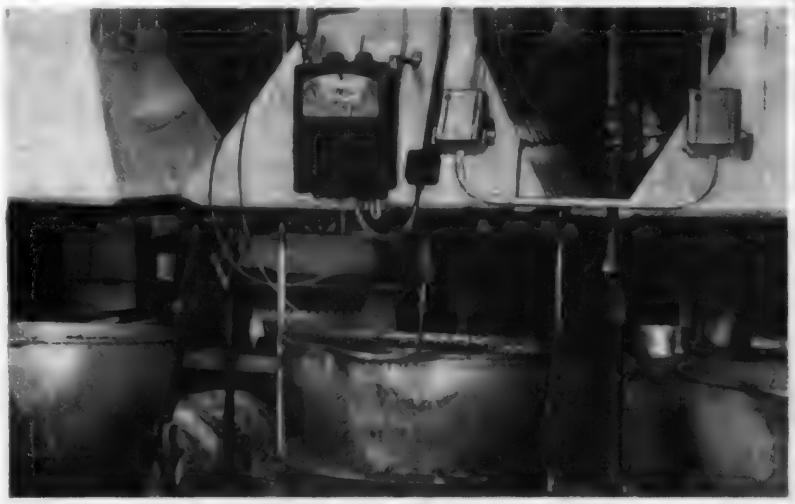
Send for free Brochure "New Defences against corrosive Attack".

6.SE.1.1

The limiting factor

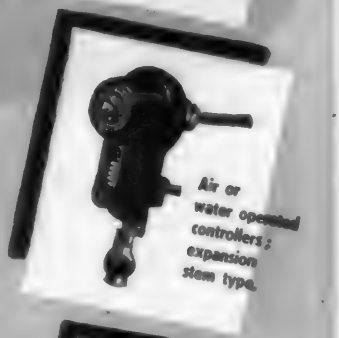
". . . one of the limiting factors to increasing the volume of production in this country is manpower, but the greater use of instrumentation and automatic control offers both the advantages of higher production and improved quality, a combination not always found in some of the other ways of increasing output per man hour."

Sir Harold Hartley, K.C.V.O., F.R.S., in his Presidential Address to the Institution of Chemical Engineers.



"Dial Set" Regulator controlling jam-boiling at British Canners Ltd.

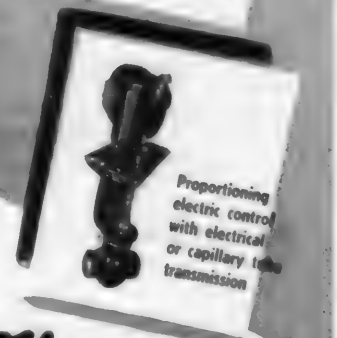
Air operated controllers with or without recording feature



Air or water operated controllers; expansion stem type.

Self-operated controllers for calorifiers, tanks, etc.

On-off electric control. Available with a wide range of thermostatic switches.



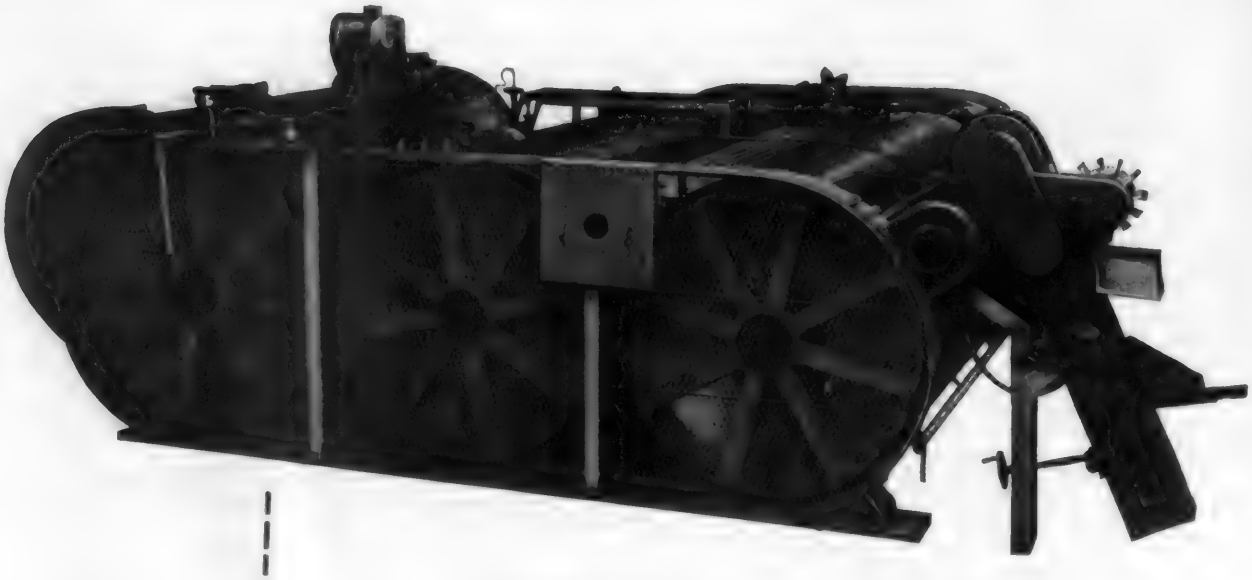
Proportioning electric control with electrical or capillary tube transmission

DRAYTON maintain a highly qualified technical staff to advise on the correct application of automatic control to processing and heating plant. This is best settled at the design stage and it is then that the help of our technical department can be most wisely employed. Get the advice of specialists who can advise impartially and from the widest experience. **DRAYTON** have free and unbiased choice of control equipment and instrumentation from their own extensive range. We are not tied to one type which must have its limitations. Tell us your problem or write for the DRAYTON CATALOGUE.

let DRAYTON advise you

AC21

THE DRAYTON REGULATOR & INSTRUMENT CO. LTD., WEST DRAYTON, MIDDLESEX. *(West Drayton 2611)*



another British engineering triumph . .

The Mather & Platt

Rotary Sterilizer

The machine illustrated above was recently installed in a well-known British cannery, and has an output of 400 cans per minute at an approximate cooking time of 19 minutes.

Mather and Platt Ltd. can offer a complete range of continuous cookers, including the following:

PRESSURE COOKERS

- Agitating Rotary Sterilizers.
- Non-Agitating M. & P. Cookers.
- Hydrostatic Cookers.

ATMOSPHERIC COOKERS

- Agitating Round Shell Cookers.
- Agitating Square Tank Cookers.
- Non-Agitating M. & P. Cookers.
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507

Mather & Platt Ltd.

RADCLIFFE, MANCHESTER

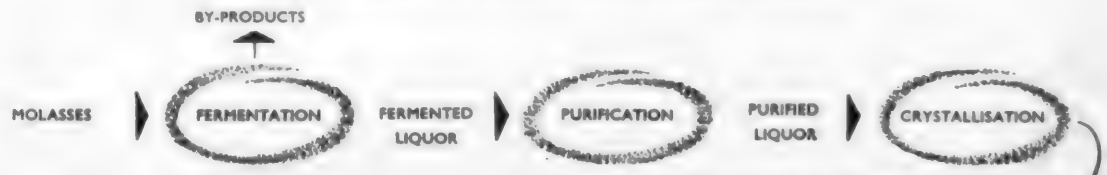
London Office: PARK HOUSE, 22 GREAT SMITH STREET, LONDON, S.W.1

FINE CITRIC ACID IN THE MAKING

Sweet Beginnings

In considering Industry as Patron of the Arts, our new artist's attempt to illustrate the first stage in citric acid production is as irrevelant as it is original. That is what comes of mixing art with molasses, which is admittedly sweet — very sweet and also undeniably the beginning of the present Sturge Citric Acid story. But molasses has not always been the raw material of citric acid.

Formerly the industry relied entirely on imports of lemon juice and citrate of lime from Italy, but in 1930 Sturge introduced a new process for producing chemicals on a commercial scale by mould fermentation. This Sturge fermentation plant was the first of its kind to be operated in this country and finally enabled a by-product of home-grown sugar beet to replace imported materials.



Manufacturers of fine chemicals since 1823

STURGE

CITRIC ACID BP

CITRIC ACID ANHYDROUS

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TGA. CA6

Stirring the imagination in the

BOEHM EXPERIMENTAL KITCHEN

In the Boehm Experimental Kitchen problems of food flavouring are tackled by experts. It is possible that they have tackled and mastered the kind of flavouring problem now causing *you* concern. So it might save you time and money to get in touch with Fredk. Boehm Ltd. immediately. Certain flavours in certain world-famous products owe their popularity to this organisation. The same skilled assistance is at your service, too, and it's free.

Fredk. Boehm Ltd., continues to produce and distribute:

M S G Mono-sodium glutamate 99% pure
YEATEX Autolysed yeast extract
PROTEX Hydrolised protein

Fredk. Boehm Ltd., 19 Bentinck St., London, W.1. Telephone: Wel 7933

These Hygienic Nesting Containers with one-piece pressed Aluminium bodies, are specially designed to effect the maximum saving of space during transport and storage. When not in use, they can be nested in only one third of the space occupied when full.

Internal top dimensions are 23½" x 14½" and the effective depth is 8". Available in two gauges, the 14 gauge weighing 8lbs. and the 16 gauge 6½ lbs. and are eminently suitable for the carriage of foodstuffs. Fitted with Aluminium lids.

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First Choice for Aluminium Equipment

WARWICK PRODUCTION COMPANY LTD

IN ASSOCIATION WITH **ALMIN LIMITED** STOKE POGES · BUCKS

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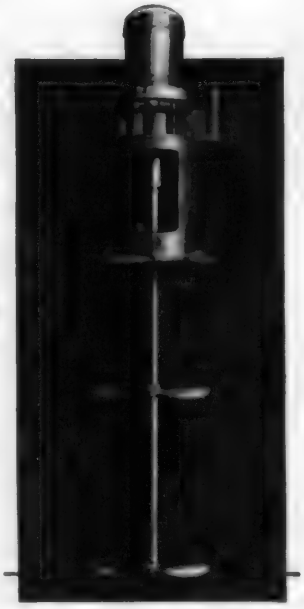
Mitchells

make good MIXERS

Type GA fluid mixer for medium speed mixing of semi-viscous fluids and where gentle agitation is required.

Type AD fluid agitator for high speed mixing of free-flowing solutions.



Type GVD permanently mounted geared fluid agitator for heavy duties.

To the Foodstuffs Industry we can supply a wide range of fluid agitating equipment for sugar syrups, sauces, soups, brine solutions for canning, essences, flavourings, aerated waters, marshmallow creams, etc.

As Fluid Agitation Specialists we have the experience and "know-how" to give you the best advice on your fluid mixing problems, whether in the laboratory or on large production scale.

MITCHELL FLUID MIXER SPECIALISTS

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For nearly a quarter of a century we have supplied Sidac in the form of sheets, reels and bags, both plain and printed. The fruits of our experience and the skill of our technologists are at your command.

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AND ALWAYS USE GOOD BOTTLES

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Telephone: GERRARD 8611 (18 Lines) *Telegrams:* UNGLABOMAN, LESQUARE, LONDON

FAT enriches bread—helps shelf life

A little fat can make a big difference to a lot of bread. Not only does fat keep the crumb moist and the bread fresh, it definitely enriches the loaf, too, and helps in obtaining a regular shape. Large bakers know that as little as 4 to 5 lb. of Silkit to every sack of flour is enough to make a major difference. For this CBC quality white shortening modifies the gluten and keeps it extensible; the dough is silky to handle and, being less sticky, it works better in machines. And the result? A loaf with good "bloom" and fine appetising appearance. A loaf that eats mellow with a fine sheen of crumb and an eggshell thin crust. A loaf that slices crisp and clean. A loaf that has added nutritional value.

Consult CBC

CBC make and supply fats for all purposes. Their experience goes back a long way and they will gladly place their knowledge at your disposal. If you have a fat problem, the Sales Director is at your disposal. 'Phone CITy 6783 or write him at the address below.

Whatever you make—
a CBC quality fat
exists to meet
your needs

Get your Fats and your Facts from CBC

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BUTTER—OR MARGARINE?

Whichever is preferred, customers will find it fresher when wrapped in Fisher's Foils. A foil, wax and vegetable parchment laminate is superior to any other material for the wrapping of Butter and Margarine; it offers complete protection from light and resultant oxidation, also from other food . . . it prevents evaporation from moisture and subsequent loss of weight and can be printed with attractive colours in Customer's individual designs, trade marks etc.

. . . Both are better packed in

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foils

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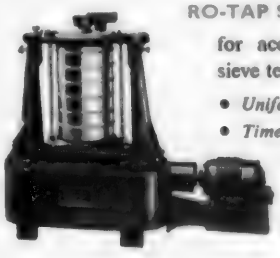
Grinding · Screening · Separating · Filtering

Laboratory Equipment



RO-TAP SIEVE SHAKER—

for accurate and consistent sieve testing.

- *Uniform mechanical action.*
- *Time switch control.*
- *Accommodates up to thirteen 8" diameter sieves.*

SAMPLE SPLITTER—

to reduce a large sample for making sieve tests.

- *Made in two sizes for heavy tinned steel.*
- *No. 1: Eighteen ½" openings.*
- *No. 2: Sixteen 1" openings.*
- *Both sizes discharge alternately in opposite directions.*

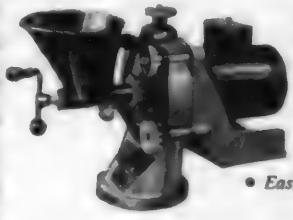
ROVAC LABORATORY FILTER—

complete working reproduction of larger machine.

- *Built on cell principle: 3 sq. ft. filtering area.*
- *Belt drive, fast and loose pulleys.*

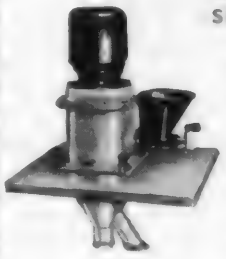
RAYMOND LABORATORY MILL—

grinding non-abrasive materials.



- *Rotor has eight steel swing hammers and runs at high speed.*
- *Supplied with five perforated steel screens, of different sizes, to suit product.*
- *Easily dismantled for cleaning.*

RAYMOND LABORATORY SEPARATOR—



self-contained air unit for dry particle size classification.

- *Separating chamber encloses all rotating parts.*
- *Simple to dismantle and clean. Fan and whizzer combination easily changed to suit product.*
- *Motor bearings grease-packed. No oiling required for separator parts.*

OTHER LABORATORY PRODUCTS INCLUDE

SCREENS AND ELUTRIATORS

L.8.2.

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. . . AND SEE . . .

WHY A TUBE?

It is HANDY A tube is an applicator as well as a pack. Requires no spoon or implement.

ECONOMICAL No waste. Squeeze out just as much as required.

HYGIENIC Tubes protect food against drying out and contamination.

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LIGHT Tubes give maximum contents for minimum bulk.

LOW COST The cost of tubes is inclusive of cap, liner and printed label. Lower freight charges. No damage in transit.

And it has SALES APPEAL
Tubes have eye and palate appeal — they sell more!

Our Technical Division is ready to co-operate on any tube-packaging project and work with you in developing it. Please write or telephone:

Hand or automatic filling according to your output. Wide range of sizes and capacities.

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for food-packaging in Tubes

A Pectin for every purpose

ELPEX

The standard Apple Pectin. Completely starch-free, its high quality, clarity, and jel-making properties never vary.

NSF GRADE

A pectin of standard "Elpex" setting strength but specially prepared for the darker jams where maximum clarity is not essential.

XL GRADE

For specialised products such as Jelly marmalade. In colour and clarity, "X.L. Grade" replaces powdered pectins at less than half the cost.

and NOW!

LIQUID SLOW-SET PECTIN

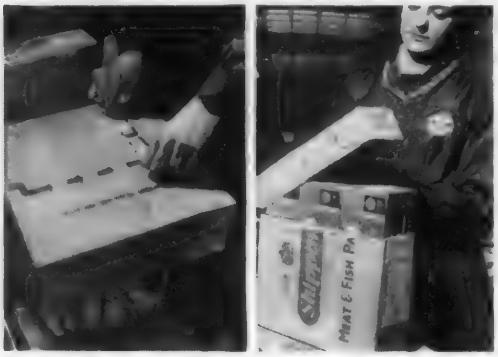
Guaranteed setting temperature. Specially suited for 7's, 14's and bulk packs of jam where ordinary pectin causes caramelisation and pre-setting.

EVANS APPLE PECTINS

TWENTY-FIVE YEARS ago, William Evans & Co. pioneered the manufacture of Pectin in Great Britain. Their unique experience is freely available to jam makers through the Technical Advisory Service. Sample quantities for production testing will be sent on request.

WILLIAM EVANS & CO. (HEREFORD & DEVON) LTD., WIDEMARSH, HEREFORD

1 PROTECTION. *It's the corrugation that ensures the safety of the familiar glass jars of Shippam's meat and fish pastes. These new Bowater tear-open cases will take plenty of buffeting.*



2 *No unkind cuts. One quick tearing movement and the case is open. Off with lid — and there are the inner cartons, just as they left the factory. This new container certainly saves valuable unpacking time — and labour.*

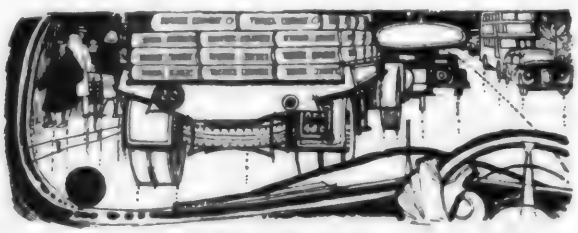
3 *Price marking is quick and easy. And the inner display carton arrives at the point of sale unscratched by opening tools, fit for the finest shop.*

4 *The quicker on show, the quicker the sale. Bowaters tear-open cases cut the time-lag between delivery and display — a great help to the busy retailer.*

Tears without Tears

The value of the new Bowater tear-open corrugated cases has quickly been recognised by manufacturers keen to give that extra bit of service to their retailer customers. Shippam's, the enterprising Chichester manufacturers of meat and fish pastes, have adopted them after sales representatives and customers had given an enthusiastic reception to this new easy-to-open container.

So much stockroom work is done by women these days — in ordinary retail shops as well as self-service stores — that a case that can be opened without risk or loss of time is a real boon to the staff and to the busy manager. In the words of Mr. Martin, manager of the Express Supermarket, Edgware, to whose co-operation we owe the accompanying photographs: "The girls say that these cases are just what's needed in a busy stockroom like ours. No cut hands. Just a quick, clean opening job."



Stacked on a lorry, multiwall sacks look neat and efficient, a credit to the name they display.

Wherever they are on show — at trade fairs or on a building site, for example — they serve as reminders of your name to passers-by.

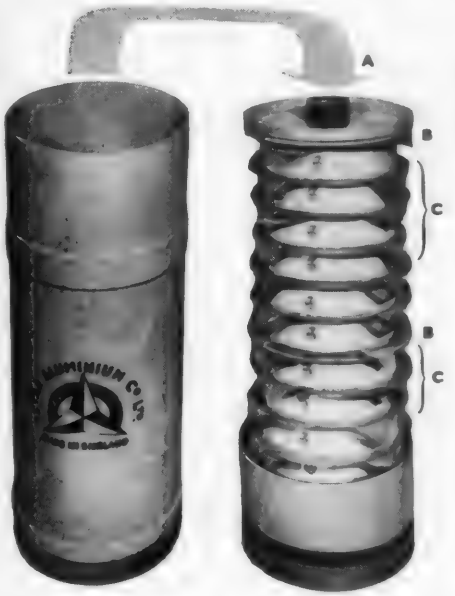
Bowater multiwall sacks take your trade-mark to faraway places.

Moving Display

From every point of view Bowater multiwall sacks are a good investment. By varying the number and type of plies, i.e. walls, the protection they give can be varied to suit the nature of the product they carry, be that soft powders or hard crystals. And they take up the absolute minimum of storage space on the lorry and in the warehouse.

Wherever they go, multiwall sacks bring your name and the name of your product before the public a thousand times a day. And the service of the Bowater Design Studio may be enlisted to make your multiwall sacks worthy 'travelling posters' for your company.

PACKAGING BULLETIN



The reels of Star Capping Strip are packed around a core (A). Plywood discs (B), placed at intervals, help keep the contents rigid, as do the fibre discs (C). Waxed Kraft is laid for protection between the strip reels and the discs. At top and bottom the drum is reinforced by steel bands. To close the pack, the body of the drum (left) is slipped over the contents, fitted into the lid (right) and secured by sealing tape.

Better by Drum

Further proof of the versatility of Bowater fibre drums comes from Arthur Woollacott & Rappings Ltd., who market the well-known "Star" capping strip for the milk industry. The "Star" people put their packaging problem, and all that it involved, before the Bowater fibre drum experts who, after some research and experimenting, produced the answer in the form of a complete pack, with fitments.

Mr. A. J. Budden, sales manager of the foil division of Woollacott & Rappings, describes the result as "a wonderful success". Two of its "outstanding virtues" for the milk industry, he lists as follows:

"It uses 25% less storage space compared with heavy wood packing cases and reduces the tare weight of each lorry load by 20%.

"Handling time in the dairy is cut down by over 50%."

Mr. Budden adds:

"All the dairy managers who have experienced this revolutionary pack have insisted that we standardise on it immediately for all their supplies."

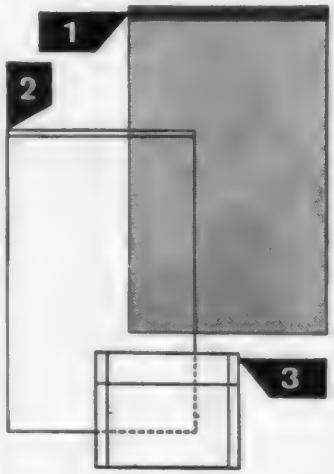
Other manufacturers of products as different as industrial chemicals and men's hats obtain similar benefits from these light, tough, non-returnable Bowater drums. So do their customers. The Bowater drum specialists will be glad to tell you more about them.

In the (Film) Bag

A variety of goods finds its way into film bags these days. This form of packaging is particularly suitable for the hundreds of different items in the outfitting and allied trades. Shirts, handkerchiefs, nylons, nightwear all retain their point-of-sale glamour in tear-resistant film bags, however many times they may be handled before actual purchase.

The latest Bowater film bags are made with the "grain" running horizontally across the bag. This gives even greater strength and tear-resistance. The shirt or pyjama bag may be further toughened by doubling the top lip (1) or by reinforcement with nylon cord (2). Easy packaging and handling is a feature of the handkerchief wallet. The flap (3) just turns over.

Bowaters also make waxed and laminated bags for a host of protective jobs.



Waxed Colourful

It needs colour to do full justice to this gay pack for Eskimo Brand frozen fish. Designed by the Bowater Studio and featuring a full-colour photographic transparency, the pack demonstrates how the wax coating on Bowater protective wrappings adds gloss and sparkle to the whole design, thus giving a new quality of sales appeal to products in the "see-and-buy" field.

The Eskimo pack is a full-colour gravure job which has to be a silent salesman for its contents not only here but also in the United States, Canada, Australia and France. Fortunately the protective properties of Bowater waxed wrappings are as good as the printing surface.

Inquiries on any aspect of Bowater packaging will be welcomed by

DIVISIONAL SALES MANAGER, PACKAGING DIVISION,
BOWATER HOUSE, STRATTON STREET, LONDON W1 MAY 8088

A NEW MIKRO PULVERISER NOW AVAILABLE

No. 1SH Mikro-Pulveriser completely equipped, including motors, drives and switches, wired and mounted on stand legs; a complete self-contained grinding plant.

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Built for precise particle control, the MIKRO-PULVERISER provides higher production at lower cost. New development has particular value in processing of heat-sensitive materials. In many cases it will effect a 25% reduction in temperature rise with a corresponding increase in production per horse-power hour. Its enhanced efficiency widens its field of application by making possible grinding of certain materials hitherto found baffling or impossible to handle.

Examples	*Hourly Outputs*					
FACE POWDER MIXTURE	350-lbs.	FIRST-CLASS BLEND				
SUGAR	350-lbs.	85-87% THROUGH 300 MESH B.S.S.				
KAOLIN	450-lbs.	100%	,,	,,	,,	,,
GYPSUM, RAW	1,000-lbs.	88%	,,	100	,,	,,
CHROME, YELLOW	750-lbs.	99·9%	,,	200	,,	,,
ZINC OXIDE	350-lbs.	99·9%	,,	300	,,	,,
ICING SUGAR	350/600-lbs.	87 or 67%	,,	300	,,	,,

Please telephone or write for full specification and prices of all models to :—
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TRADE MARK

TRANSPARENT ACETATE FILM

Sells on sight!

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- Does not wrinkle.
- Can be laminated.
- Printable in multi-colours

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- CELLULOSE CLOSURES . . . Contain No Metal . . . Require No Adhesive.

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Two-sided Tinted Surface Boards
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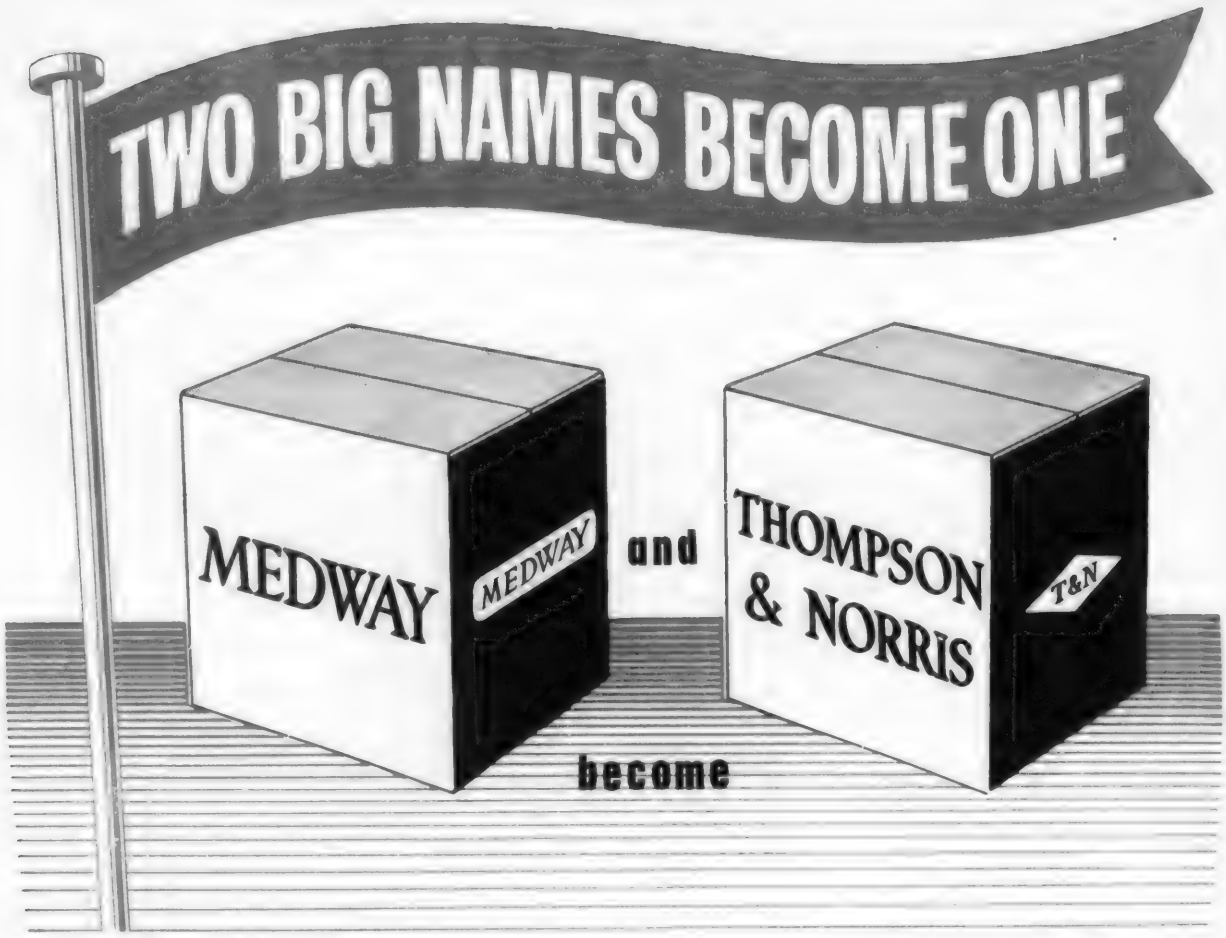


REED CORRUGATED CASES LTD.

IMPORTANT NEWS! **Britain's two leading manufacturers of corrugated products are now one. The Medway Corrugated Paper Co. Ltd., and The Thompson & Norris Mfg. Co. Ltd., have been combined into a single company—Reed Corrugated Cases Limited.**

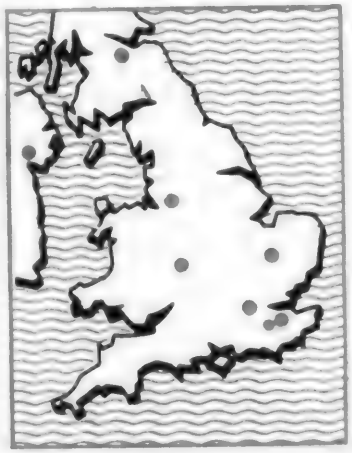
This development will benefit industry throughout the country. Here are four good reasons:

★ *Reed* sales offices throughout the U.K. give you a complete and personal service.

★ *Reed* production capacity, with eight factories, can execute your orders with speed and efficiency.

★ *Reed* offers you the accumulated skill and technical experience of two great companies.

★ *Reed* streamlined organisation gives you top quality at competitive prices.



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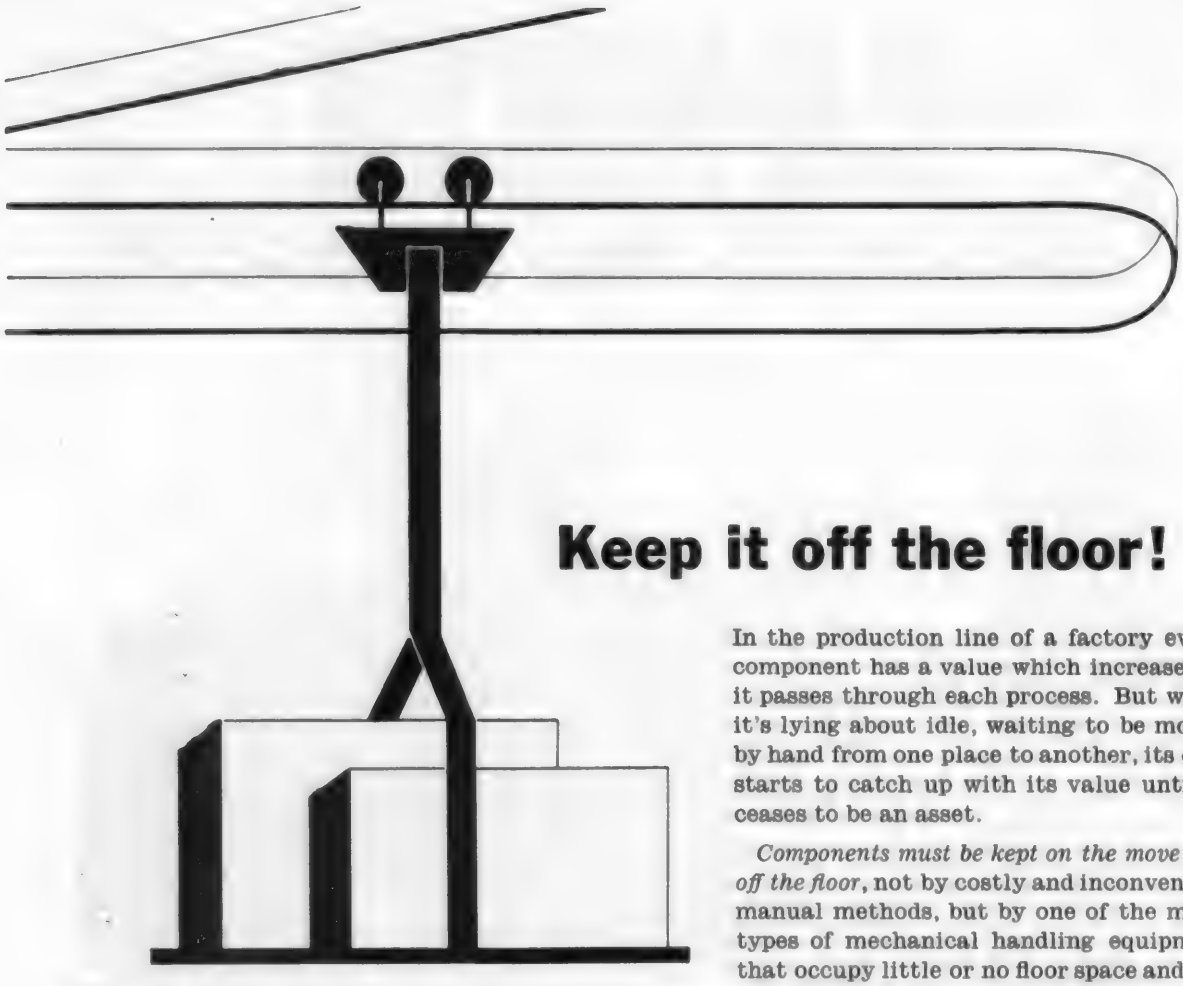

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In the production line of a factory every component has a value which increases as it passes through each process. But while it's lying about idle, waiting to be moved by hand from one place to another, its cost starts to catch up with its value until it ceases to be an asset.

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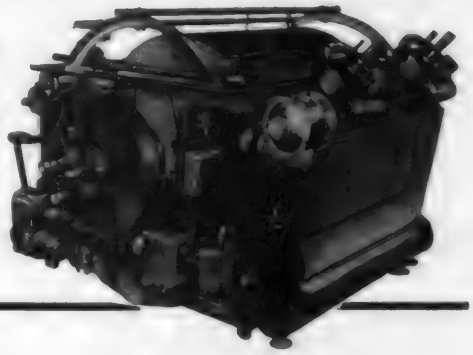

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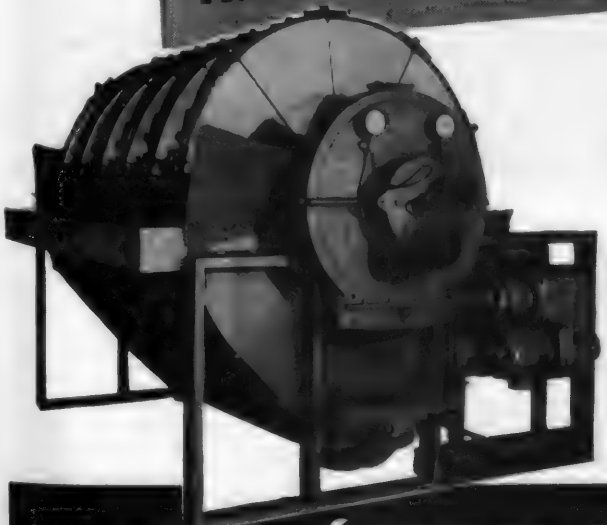

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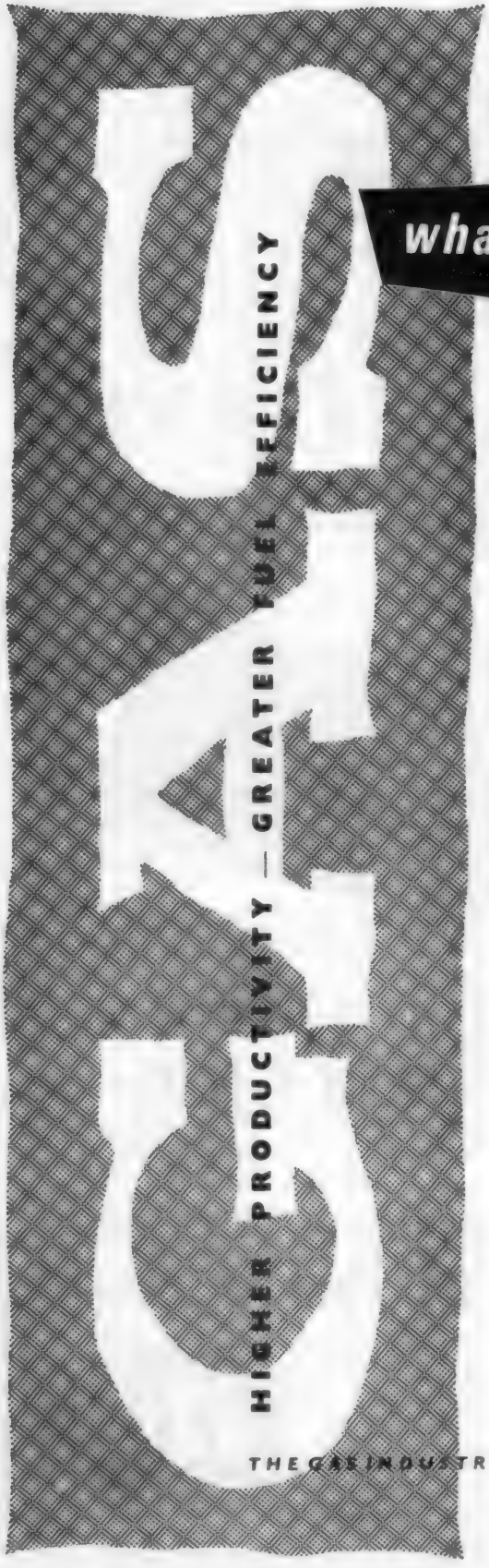

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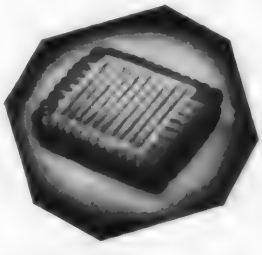

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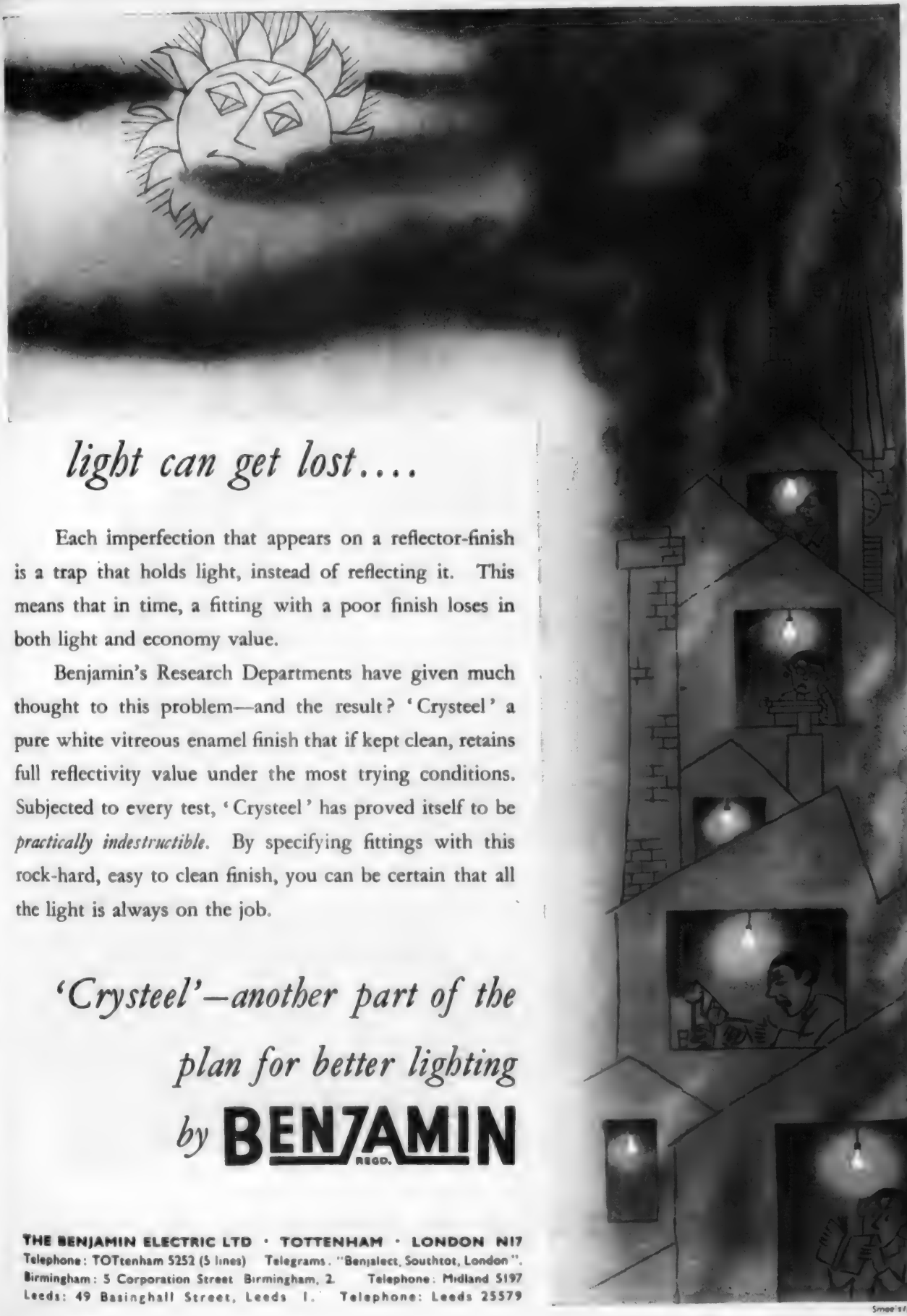

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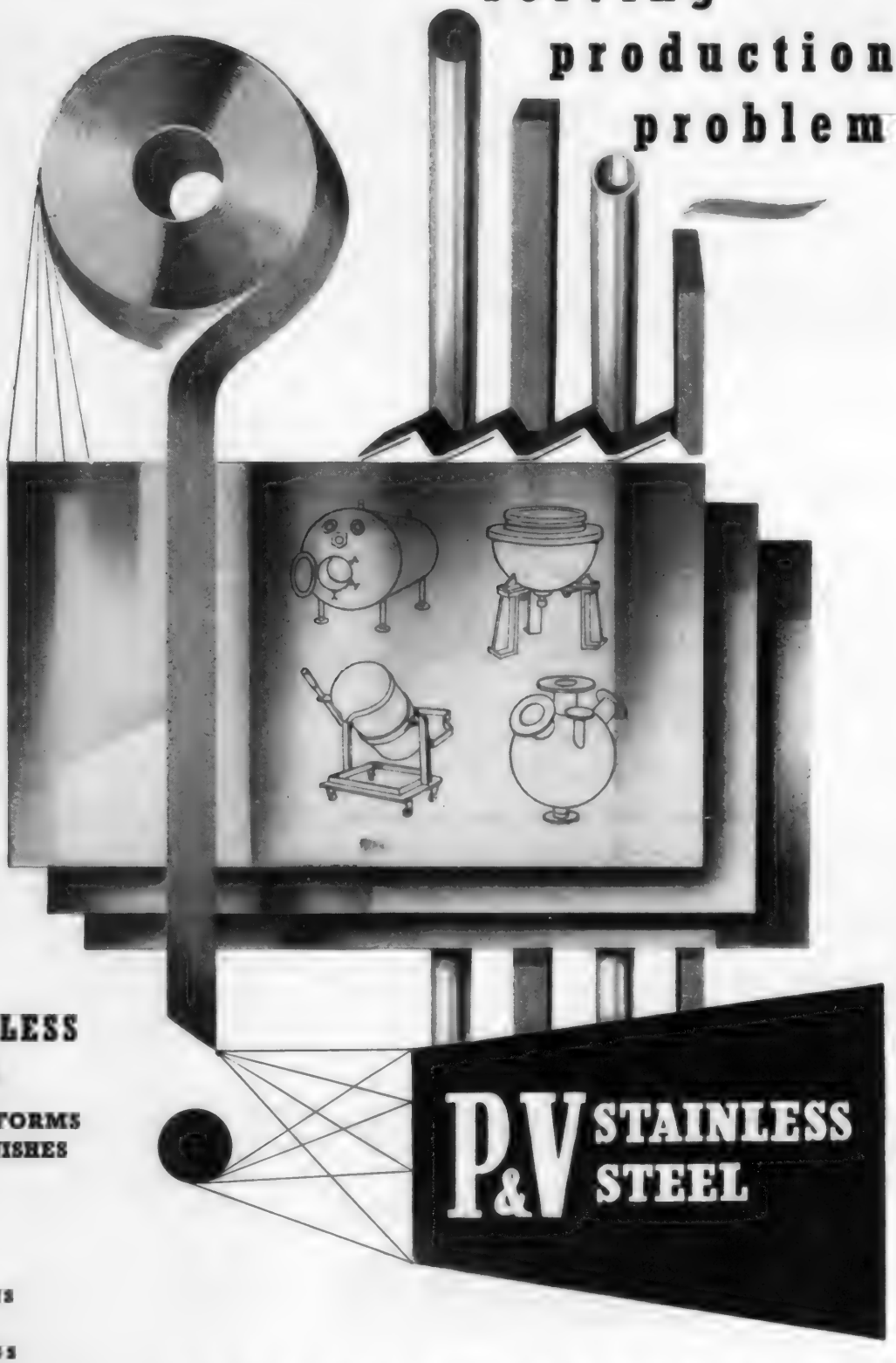

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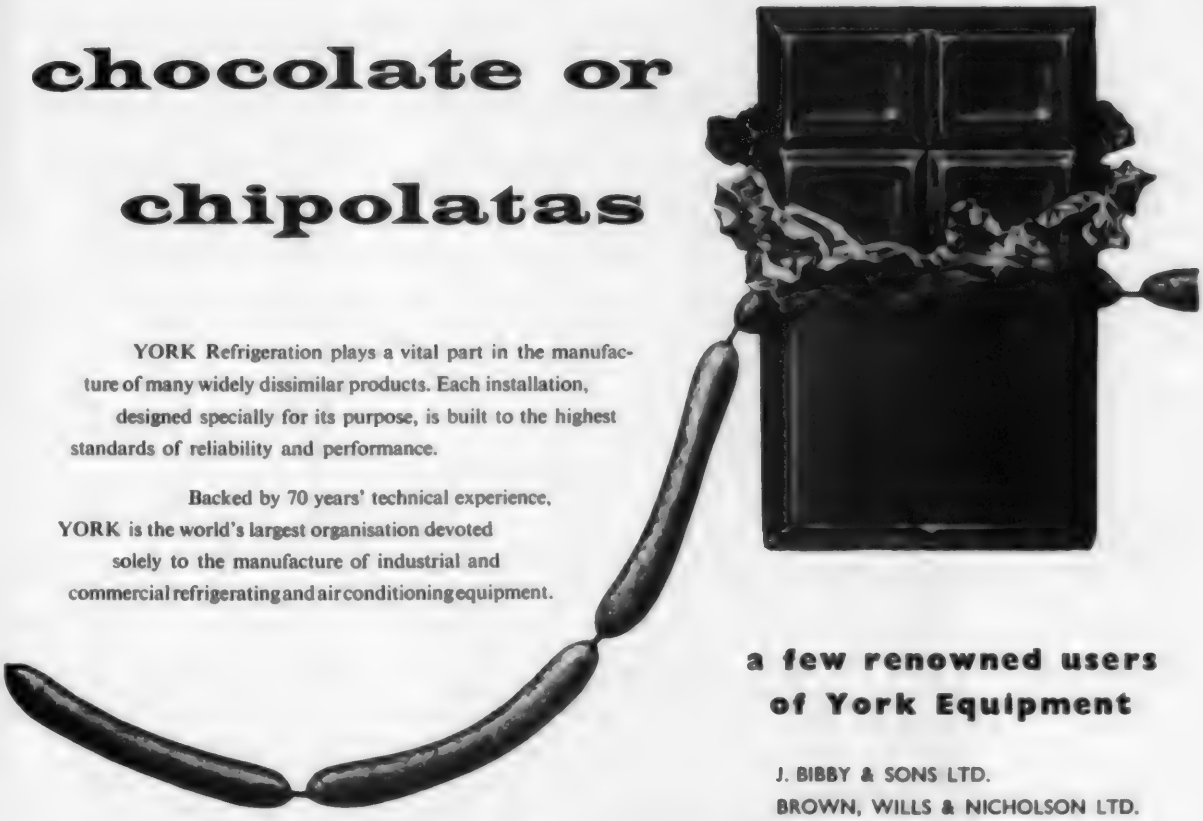

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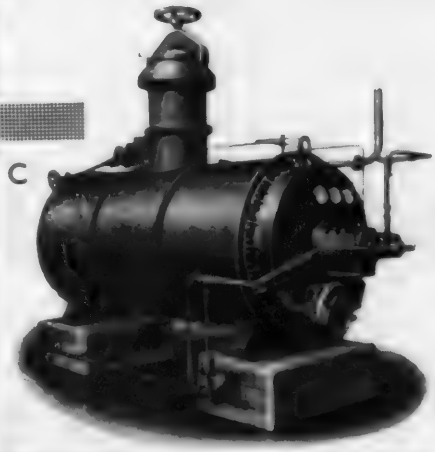

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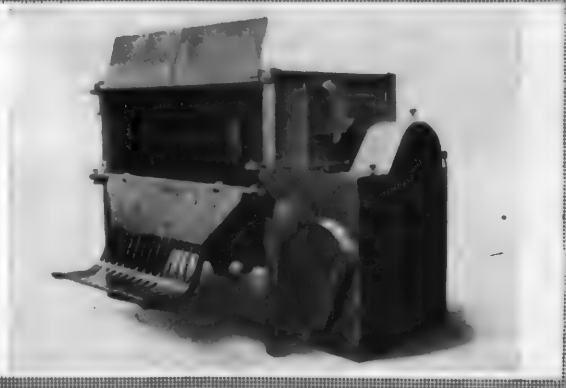

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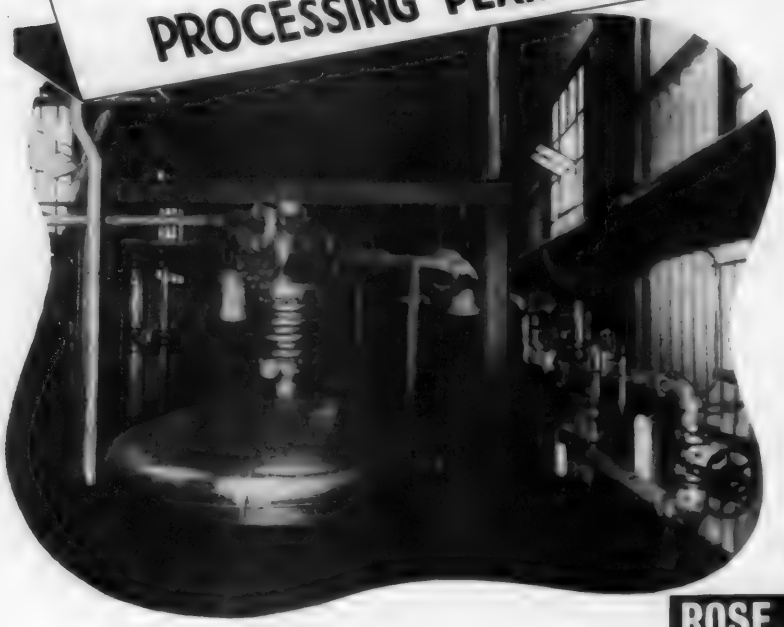

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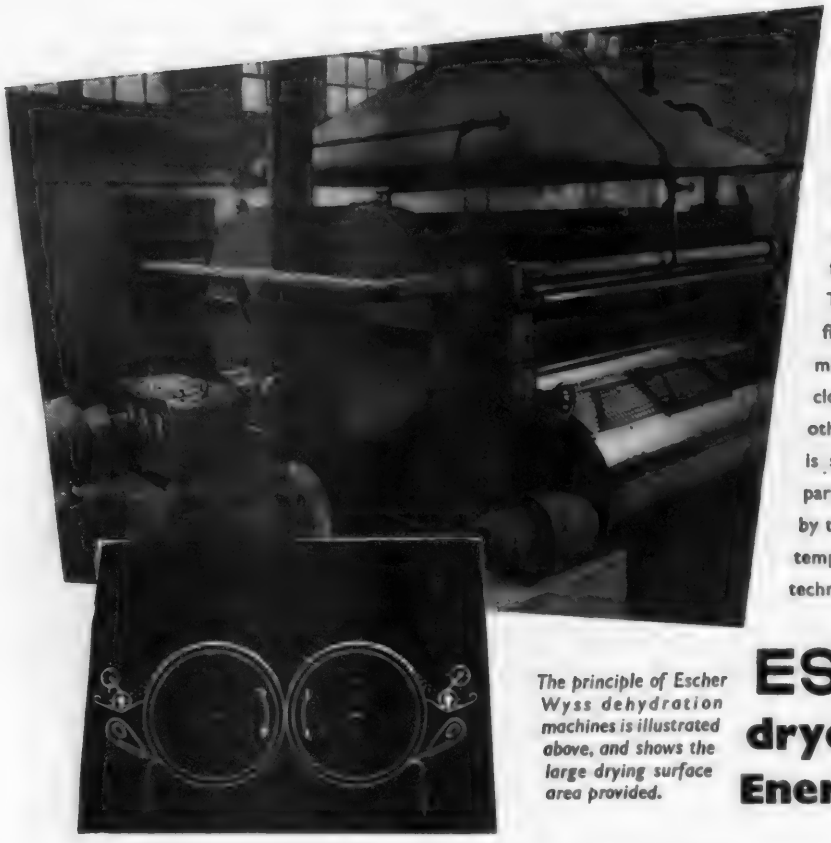

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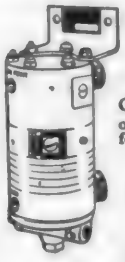

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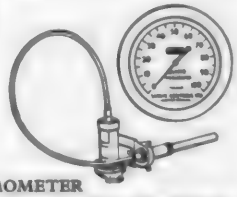

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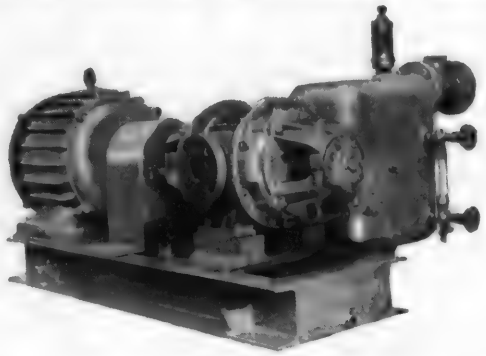

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FOOD MANUFACTURE

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CONTENTS

Editorial - - - - - - - - - 219

Meat Extract—A Revaluation. *By A. E. Bender, B.Sc., Ph.D., F.R.I.C. and T. Wood, B.Sc., A.R.C.S., D.I.C., Ph.D.* 223

Food Production–Complacencies and Facts-1. *By Hugh Nicol* - - - - - - - 228

South Wales' New Creamery - - - - - 235

Trace Elements in Food—2: Fluorine. *By C. F. M. Fryd, B.Sc., A.R.C.S., A.R.I.C.* 236

Research on Fish Preservation and Processing. *By H. L. A. Tarr, M.S.A., Ph.D.* - - 239

Fish Freezing in Ulster - - - - - - 244

Confectioners Discuss their Problems at International Meeting. *By D. R. Felstead, F.R.I.C.* - - - - - - - - - - 245

Advances in Food Technology - - - - 247

Machinery and Equipment - - - - - - 249

News Digest - - - - - - - - - - 251

Food News Overseas - - - - - - - 258

Packaging - - - - - - - - - - 259

New Companies - - - - - - - - - 260

Trade Marks - - - - - - - - - - 260

Information and Advice - - - - - - 261

Recent Patents - - - - - - - - - 262

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FOOD MANUFACTURE

Vol. XXXI, No. 6 June 1, 1956

Science and common-sense

CLEAR THOUGHT is gradually crystallising above all the current sensational and often irresponsible speculations about the scientific future of the world in general and industry in particular. In this month's issue (p. 228) Prof. Hugh Nicol gives a realistic warning to those who look forward to a life of atomic-powered ease and, on a possibly lower but closer plane, an authoritative assessment of the role of research in industry has been made by the Earl of Halsbury, managing director of the National Research Development Corporation.

"We are advised on all sides" said Lord Halsbury at the closing session of an engineering refresher course organised by the Incorporated Plant Engineers, "to apply science ever more intensively to our industry." The object of his paper was to enquire in what directions our industries require the more intensive application of science and in what direction they require, not the application of science, but of commonsense and good management.

It is important not to be hypnotised by spectacular applications of science in one field, nuclear energy say, into supposing that the performance can be repeated in arbitrary fields, merely by virtue of the wish to do so, warned Lord Halsbury. We can only apply science to what is under our own control. Industrialists should have the courage to say "We don't need a research laboratory if this is indeed the case." They should also ensure that, if their welfare depends upon another industry, this industry is carrying out adequate research. They may not need a research laboratory but they may need a laboratory for trouble shooting or for control purposes. They may need to be kept in touch with reports of advances in their field through the appropriate industrial research association.

The best way to get good value from equipment, said Lord Halsbury, is to employ well-trained personnel to run it. What is needed is a steady intake of the products of our national system of education, the output of our technical and technological colleges and universities and the payment of salaries and wages which will not only hire them but keep them.

Research is no panacea for archaic equipment, a low rate of replacement, inefficient use of machinery, poor labour relations and poor quality technical staff. In critical times each of us with industrial responsibility must ask himself "What is wrong with my industry . . . what can I do about it?" For example, those concerned with the soft drinks industry would find that there is little application for "deep" research, but rather for a combination of detective work and honest enquiry, methodically undertaken. In some industries scientists may be the servants of the engineer, in others the reverse may be true, while in others again, operational research—enquiries designed to ascertain the optimum way of employing a fixed facility—may be desirable.

There is no answer to the industrialist who asks "how much should I spend on research?" If an industrialist decides that success and prosperity depend on factors to which science, rather than competent management can make a contribution, then he should institute a research programme he can afford. Otherwise he should recognise the logic of events and of his position in industry. Pseudo-research is no substitute for competent management and up-to-date equipment, a professionally skilled team of employees and a determination to compete and expand.

Fats and heart disease

A COMPLETE revolution in our present-day dietary habits is foreshadowed by the findings of a team of South African doctors. These suggest that eating animal fats may predispose people to coronary heart disease while vegetable fats do not. Experiments by Prof. J. F. Brock of the University of Cape Town and his colleagues, reported in the *Lancet* recently, indicate that the nature of dietary fat affects the lipid content of the serum; oils in which a high proportion of the fatty acids are unsaturated, *i.e.* most vegetable oils and those derived from fish and marine mammals, consistently depress serum-cholesterol levels. If the view is accepted that a high cholesterol level is associated with coronary heart disease, then this is circumstantial evidence that the development of coronary heart disease in man is influenced by the type of fat he eats.

This theory is supported to some extent by inter-racial studies. Coronary heart disease is not preva-

lent in the olive oil-eating Latin peoples or in primitive communities where consumption of maize, soya bean and sunflower seed allow the amount of unsaturated fatty acid to exceed that of saturated fatty acid in the diet.

The experiments suggest that food fats and oils seem to fall into two classes, whose effects on plasma-lipids are antagonistic to each other. If these results are substantiated coronary-artery disease becomes in part a preventable disorder but at a tremendous cost. The *Lancet* opines that "the hydrogenation plants of our modern food industry may turn out to have contributed to the causation of a major disease." To preserve the unsaturated fatty acids in vegetable oils and marine oils and to make them palatable and acceptable to industrial populations would be a herculean task. All the principles of the modern margarine industry might have to be put into reverse.

However, systematic knowledge of the ratio of essential to total fatty acids is far from complete for single artificial dietary fats and it is almost non-existent for the total fats consumed in the diets of any large group of persons. Thus more knowledge of the actual fatty acids in the diets of populations is needed before it will be possible to decide how variations in that ratio affect the prevalence of disease, and it is clear that this will take a considerable time. Says the *Lancet*, "In this type of research the unit of time is the decade."

Colonial food research

AN EXPERIMENTAL sugar factory in Trinidad and malnutrition studies in Uganda are among the food projects described in the 300 page report for 1954-55 of the Colonial Research Council (H.M.S.O. 9s. net). While the report is primarily concerned with agricultural research it contains much of interest to food scientists.

The sugar technological laboratory in Trinidad has completed work on modernising the experimental sugar factory, and studies on the variation of cane-juice constituents with plant growth conditions have shown that in the greenhouse a refractory juice can be produced to order by simply controlling the water supply to the cane. A critical examination has been made of the use of sodium fluoride in clarification and a study is being undertaken of the thermal conductivity of the sugar cane.

At the Colonial Microbiological Research Institute in Trinidad, a start has been made in following the microbiology of "microfermatories" and the distribution of free sugars and glycosides in the cacao bean has been studied.

Much attention was given to cocoa last year and the Cocoa Marketing Boards of Nigeria and the Gold Coast have again made large grants to the West African Cacao Research Institute. Very high-yielding Upper Amazon selections have been distributed to West African farmers and promising results have been obtained in breeding superior types of cacao.

Work continues in Uganda on the body composition of malnourished Africans before and after feeding with high calorific diets of high protein content, and investigations have been made on the water and protein contents of muscle obtained at autopsy and operations.

Investment in technologists

"THE CRYING need in the British food industry today is not so much for the technician: it is for the technologist." These were the opening words of a pamphlet sent to members of the Food Manufacturers' Federation in 1954, describing the National College of Food Technology. Since then Mr. Colin Dence has made an appeal for £20,000 towards establishing new premises at Weybridge for the college and for providing scholarships, and the Government has issued a White Paper on technical education showing how far Britain is lagging behind the U.S.A. and U.S.S.R. in this respect.

The appeal made last December for contributions towards the National College of Food Technology has so far realised less than one-third of the sum required. It is recognised that the education of the technologist is the joint responsibility of the State and Industry and that each venture in this field should be in the nature of a partnership; the State supplying the facilities and Industry contributing financially and by the release of students. By far the larger share of the cost of such a partnership falls on the State. The National College of Food Technology is a joint venture of this kind and if the right sort and numbers of food technologists are to be produced it is important that serious thought be given to the matter now. The college will be expected to provide advanced technological education leading to a new award of a diploma in technology which would be regarded as being on the same level as a University honours degree, but in seeking Treasury approval for £300,000 to build a new National College, the Ministry has made it plain that it is looking to the industry to provide a reasonable share of the cost.

The need for technologists as distinct from technicians is even greater in 1956 than it was two years ago and will be vital in the years to come. It is to be hoped that food manufacturers will give their fullest support to the Federation's renewed appeal for at least £20,000 towards the new college.

The bakers' oz.

A LOAF of bread is one of the most difficult foods to produce at the point of sale at the legal weight, according to Mr. S. Walter Butterworth, chief chemist of Ranks. Speaking to the north-west branch of the Institute of Weights and Measures Administration, Mr. Butterworth pointed out that bakers deal with materials of biological origin so that complete uniformity in their treatment is difficult, if not impossible. Dough changes its formation hour by hour and for all practical purposes the weight of bread is determined about halfway through the baking process.

On the other hand, since bread is bought daily, it should be of no great matter to the housewife to receive occasional loaves which are below the legal weight, since on average she would receive the full weight to which she is entitled. There is statistical evidence to show that a small percentage of loaves are below the legal weight but sampling over a long period has shown that the average loaf is ¾ oz. overweight, claimed Mr. Butterworth.

However, present legislation makes no allowances and a variation in the dough divider setting for as short as 1 min. might mean a batch of loaves which will reach the shop short weight, for which the baker could be held responsible and on which his reputation might hang.

Increasing the weight of dough before baking is not the answer, according to Mr. Butterworth, because the other factors are such that light weight bread is always a possibility, however small the percentage. Bakers would get a better deal if bread could be sold by average weight. At present the law relating to bread is too complicated, being based on opinions as well as facts.

Robot salesmen

SLOT MACHINES delivering hot soup, chocolate, tea and coffee may be a feature of Britain if a new company continues to be as successful as it has been. Formed last autumn with an initial capital of only £100 (since increased) this organisation—the Master Vending Machine Co. Ltd.—has already supplied three types of coin-operated vending machine, including a ball chewing gum vendor and a hot peanut vendor. They plan to introduce a multi hot-beverage vendor to the British market this winter.

At the time of writing between 1,500 and 2,000 ball gum vendors have been sold and have been supplied with about eight tons of chewing gum a week. A French company has been formed to market machines manufactured in Britain and branch offices of the main company are being opened in Amsterdam, Stockholm, Johannesburg and Dublin. "We are just starting to beat the Americans at their own game," says Toronto-born Mr. Sidney Levine, managing director of the new company.

The enthusiasm which greeted the return of coin-operated chocolate vending machines on railway stations, the popularity of the "automatic shops" on the Continent and the increasing ingenuity in the design of these machines enabling them to supply a wide range of products, point to a lucrative future for those connected with this round-the-clock method of selling, whether they make the machines, rent them, or manufacture the speciality food products to go into them.

Fish boxes—a £2 million problem

RESEARCH IS being carried out on fish boxes with the object of reducing the present high cost of packaging. Particular emphasis is being placed on the possibility of devising a suitable non-returnable container at an economic price.

The studies are well advanced and trials on experimental boxes have just begun. New types of containers which may be noticed undergoing trials are still in the experimental stage; it is too early yet to try to form an opinion of their comparative success or failure.

The work is being undertaken by P.A.T.R.A. (the Printing, Packaging and Allied Trades Research Association) and the Humber Laboratory, a subsidiary of the Torry Research Station, D.S.I.R., the suggestion for the work originating with the White Fish Authority.

It has been estimated that 15 million boxes of fish are despatched annually from the ports and that the overall cost of boxes per year is about £2 million. Even a small percentage reduction in this cost would be worth while.

Such a saving might be achieved by extending the life of returnable boxes or by producing a cheaper non-returnable box. The total average of a returnable box is about five or six journeys. A 20% improvement, say one extra journey, in the average life of a box would save over £100,000 a year. Non-traditional types of container would have to be produced at a price which would enable them to compete with the types at present in use.

The D.S.I.R. and P.A.T.R.A. will make known any results as the work proceeds, but the performance of new types under practical conditions must be quite certain before recommendations are made to the industry. An experimental non-returnable container made of moulded paper pulp is being tried out at present in co-operation with the Witchampton Paper Mills, a subsidiary of the Inveresk Paper Group. Recent full-scale tests showed where improvements could be made and, after modifications, the containers will be given further practical tests.

Toffee tax

"WE ARE fast becoming a nation of soft-stomached sweet eaters." With *non sequiturs* like this a certain C. G. Hanson writes to *The Times* from Trinity Hall, Cambridge, to suggest the monstrous idea of taxing sweets and chocolate. He must be a heavy smoker, irked by the recent increase in tobacco duty, for he thinks it only fair that sweet eaters should be penalised similarly. He would put caramels in the same revenue-raising class as coronas.

Why draw the line at sweets, Mr. Hanson? Why not put a tax on everything we eat and drink? If sweets eaters are to be taxed, why spare custard addicts and devotees of bath buns? Why should toffee-sucking schoolboys be taxed when people who adore pickled onions indulge their passion tax-free?

Mr. Hanson thinks that if sweets are taxed we won't wear out our teeth so quickly. Of course, if we stopped eating altogether we would all end up as the best dentured bunch of corpses ever.

Refrigeration and radioactivity

RADIOACTIVE TECHNIQUES which can be used by the refrigeration industry were described in a paper read at a joint meeting of the Institute of Refrigeration and the Low Temperature Group of the Physical Society by Mr. D. B. Smith recently. They include methods for tracing the movement of air and water, measuring ventilation, investigating the efficiency of air locks, measuring wear, testing filters and estimating hydrogen content.

Radioactive isotopes are widely used as tracers. A useful general tracer is sodium (Na^{24}), particularly for following the movement and detecting leaks of water. It can also be used as a control for many types of mixing of solid materials, where it indicates the time taken for a mixing process to be completed.

The use of an isotope of a particular element as a tracer for that element is the most useful example of the method. In almost all operations the radio-isotope faithfully follows the inactive one, the proportion of the two remaining the same. Hence the method can give useful quantitative as well as qualitative results. Such a tracer is necessary where the compound changes phase, during the experiment, *e.g.* when following the cycle of a refrigerant.

The estimation of the rate of turnover of air in a building can be carried out by radioactive tracer techniques and similar techniques have been used to test the efficiency of air locks on refrigeration chambers. Radioactive tracers can also be used to determine the rates of wear on mechanical components in engines, compressors and gear wheels. In many cases, if the component undergoing test is small, it can be made radioactive by insertion in a nuclear pile. Alternatively a radioactive insert or radioactive plating may be used.

Filter efficiency can be tested by using radioactive particles. The small fraction of particles which are transmitted through the filter can be detected by sensitive instruments, and it is quite reasonable to expect to detect a transmission of one particle in 10^6 through a filter. The principal material used consists of particles of resin on to which radioactive gold is adsorbed.

Radiation can itself be used to preserve food. In this connection freezing can control the unpleasant side reactions caused by radiation. According to Mr. Smith, it offers protection to the proteins and many vitamins and also reduces the formation of unpleasant colours and tastes.

Pigs in the parlour

THE nineteen-fifties seem destined to promote the pig to higher esteem than at any period in its history of domestication by man. Not so long ago on the TV screen we saw a little pig being stroked by members of a panel game, an experience which the piglet seemed to enjoy as much as the audience. And then a Sunday paper reported that the Marchioness of Downshire had volunteered to keep a piglet in her Belgravia home for three days before it was to be raffled at a charity ball. "It won't be much trouble," the lady is reported to have said. "In fact it will probably be great fun. I've got a baby's playpen for it, and I shall look after it myself."

Thus does "Pigs in the parlour and peacocks on the promenade," a classic quote on some people's behaviour, take on a more literal meaning now that piglets are admitted further than the gate or back door. It all seems part of a new outlook on pigs, or for pigs. We are now told that the filthiness of pig-sties is the fault of their owners rather than of the pigs. Today, we are assured, the science of pig-keeping is one of unrivalled hygiene.

But are not our thoughts tinged by the betrayal to come? While the biologist seems non-committal in defining the pig as "a genus of artiodactyle ungulate mammal which wallows in mire as do other pachydermata," he hastily adds that it thus wallows only to cool itself. The rest of us are thinking of only one thing, the call of the stomach; if we search our hearts, it is only the pig's demise and conversion into bacon, ham and roast pork and crackling that we look forward to.

Yes! the piglet seems a perky little chap. But as Ogden Nash summarised it so succinctly:

> The pig, if I am not mistaken,
> Supplies us sausage, ham and bacon.
> Let others say his heart is big—
> I call it stupid of the pig.

MEAT EXTRACT—A Revaluation

By A. E. Bender, B.Sc., Ph.D., F.R.I.C., and T. Wood, B.Sc., A.R.C.S., D.I.C., Ph.D.

(*Research Department, Bovril Ltd.*)

Early opinions on the nutritional value of meat extract ranged from open scepticism to wild exaggeration. The gradual identification of the compounds present in meat extract caused many contested claims and produced a confused nomenclature. Even now only about two-thirds of these compounds have been accounted for. Here the authors review the complex and controversial literature on the composition, properties, and preparation of meat extract and re-assess it in the light of modern procedures and methods of investigation.

Early work

COMMERCIAL extracts of beef were on the market from the beginning of the 19th century, but scientific and commercial success was achieved only after the introduction of an improved product by Liebig in 1847.

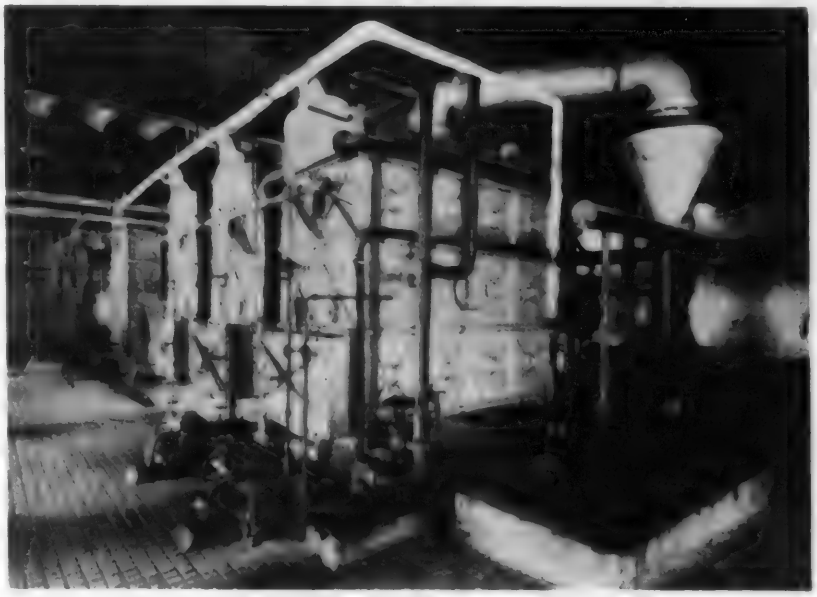
Some of the drawbacks of the early preparations are revealed by the various criticisms that were written in medical and scientific journals of the time. For example, one writer describes them as a "new and audacious product," while Dr. Druitt in the *Medical Times and Gazette* of 1869 said "a pot of evaporated urine bears a painfully close resemblance to a pot of extract of meat—both extracts have many constituents in common." A vigorous refutation of these criticisms as applied to properly prepared extracts was made by Thudichum[1] in 1869.

Before Liebig's time meat was extracted to exhaustion, sometimes under pressure, a process involving the extraction of large quantities of gelatin, quite apart from the fact that many preparations were adulterated with added gelatin and bone extract.

Liebig's contribution to the subject was to carry out only a brief extraction, so that the "soup" consisted of most of the water-soluble parts of animal muscle with only a trace of gelatin.

Description

Some confusion has arisen in the literature over the different types of extract that can be prepared, and most textbooks and review articles quote Liebig's original statement that 34 lb. of trimmed meat yield 1 lb. of extract. In practice two very different types of extract have been prepared commercially. The first is known as "direct extract" or, according to the report of the Meat Extract Sub-Committee of the Society of Analytical Chemists,[2] "Essence of Beef." This is defined in the report as the product of an extraction sufficiently prolonged to produce a jelly on cooling; in other words, a considerable amount of gelatin has been extracted. In this case approximately 13-14 parts of meat are needed to yield 1 part of direct extract, containing about 34% moisture.



Concentration of Meat Extract

This plant concentrates liquor from 1·5% to 45% solids and comprises three evaporator bodies arranged in series with a feed pump, preheater, jet condenser, air pump, concentrate pump, condensate pump and heat exchanger. The first stage evaporates at 92-89°C., the second stage at 76-71°C., and the third stage at 52-46°C. The final concentration to 83% solids is carried out at atmospheric pressure with free access to the air.

The second product is known as No. 1 extract or, in the S.A.C. report, merely as "Meat Extract." This is a by-product from the manufacture of corned beef, and involves the immersion of chopped beef in boiling water for a limited period. Very little gelatin is extracted and the product is the normal article of commerce today. It requires 50 parts or more of trimmed meat to produce 1 part of this extract, containing 17% moisture.

Commercial uses

The value of meat extract lies in its unique flavour and also in its physical properties. The

flavour, and incidentally the colour, is developed during the concentration process and is probably largely due to the formation of Maillard compounds by reaction between the amino acids and the glucose. It is essential to carry out the later stages of the concentration in open pans with free access to the air. In this sense the commercial requirements of flavour are at variance with the nutritional requirements, for a product ideal from the nutritional point of view, *i.e.* prepared without heating so that there was no destruction of vitamins, would be almost devoid of flavour (although the possibility of artefacts of nutritional value cannot be overlooked).

Nutritional value

The early claims for the nutritive value of meat extract were relatively modest, involving flavour, promotion of gastric secretion and a general, so-called, "stimulation." Later claims became wildly exaggerated, and it was even suggested that meat extract would maintain life as the sole source of nutrient. The reaction to this exaggeration was so extreme that medical opinion stated that meat extract was merely a flavour and a stimulant of no nutritional value. In fact, Hutchison and Mottram[3] stated that these preparations have their place in the kitchen and not in the sickroom. Later work, however, showed, as indeed would be expected, that much of the water-soluble vitamins of muscle are extracted and that the commercial article is a rich source of vitamins B_2 and B_{12} and nicotinic acid; the thiamine, being heat-labile, is present in only small amounts. Booth and Barton-Wright[4] showed that about 80% of the nicotinic acid and riboflavin are leached out of the minced beef during the preparation of corned beef. About 50% of the nicotinic acid and 20% of the riboflavin of the meat remain in the concentrated meat extract, which contains 1 mg. and 25 μg. per g. respectively of these two vitamins. The vitamin B_{12} content is approximately 0·20 μg. per g.[5]

Table 1

A. Compounds whose Presence in Meat Extract is Well Established

Substance	*Reported by*
Albumen	Berzelius (1828)
Magnesium	Chevreul (1835)
Calcium	*Ibid.* (1835)
Phosphates	*Ibid.* (1835)
Creatine	*Ibid.* (1835)
Creatinine	Liebig (1847)
Lactic acid	*Ibid.* (1847)
Inosinic acid	*Ibid.* (1847)
Hypoxanthine	*Ibid.* (1850)
Carnosine	Gulewitsch *et al.* (1900)
Carnitine	Krimberg (1906)
Inosine	Levene and Jacobs (1908)
Anserine	Wolff and Wilson (1932)

B. Compounds whose Presence has been Claimed

Inositol	Thudichum (1869)
Fluorescentine	*Ibid.* (1869)
Phosphocarnic acid	Siegfried (1894)
Succinic acid	Kutscher *et al.* (1903)
Carnitine ester	Kutscher and Lohmann (1906)
γ-homocholine	Kutscher and Lohmann (1906)
Choline	Krimberg (1906)
Methyl-guanidine	*Ibid.* (1906)
Vitiatin	Kutscher (1907)
Taurine	Jona (1913)
Glycine	*Ibid.* (1913)
Alanyl-alanine	*Ibid.* (1913)
Formic acid	Waser (1917)
Avertabrin (an unidentified iminazole)	Kutscher and Ackermann (1926)
Myokynine	Ackermann (1926)
Crotonbetaine	Linnenweh (1928)
Adenylic acid	Steudel (1932)
Oxalic acid	*Ibid.* (1932)

In addition urea, uric acid, glycogen, glutathione, and histamine have been reported.

Meat extract contains about 12% of protein and degraded protein and about 2% of free amino acids. This protein is, however, far from complete, having a biological value close to zero. This merely means that when fed alone it cannot be used as a source of body protein, but when taken as part of a mixed diet the constituent amino acids, both free and in the proteoses and proteins, can all play their part in conjunction with the other dietary amino acids in serving as the ingredients of body protein.

Carnosine (β-alanyl histidine) is apparently hydrolysed during digestion to free histidine as it can serve the rat as the sole source of histidine, either orally or subcutaneously;[6] anserine (methyl carnosine) cannot.[7]

Chemical composition

The analysis of meat extract for commercial use is designed to assess quality and genuineness and for this purpose water, ash, chloride, total nitrogen, and total creatine and creatinine are sufficient. Further information is revealed by determination of gelatin, amino nitrogen, tannic acid precipitation and the separation into soluble and insoluble nitrogen. These data, however, throw little light upon the actual composition of meat extract from the scientific point of view.

The greater part of the work on meat extract was done before 1910 using classical chemical methods, which involved long and laborious isolation and identification procedures. Some workers made claims for the presence of compounds which other workers rejected, and some claims still remain unconfirmed. Table 1 lists the constituents of meat extract that were identified in this way.

More modern methods, such as paper chromatography and electrophoresis would appear to offer considerable advantages, both in the rapid confirmation of known compounds and also in revealing some of the unidentified compounds present. A start along these lines has already been reported.[8]

Preliminary purification

For analytical purposes the presence of protein and inorganic salts tends to interfere with the identification and estimation of the organic compounds and a preliminary treatment is necessary. Protein is removed by dialysis and the inorganic salts by a newly developed method of electrodialysis.[9] The material can then be chromatographed and the various ingredients identified by means of a wide range of colour reagents, each specific for a different compound or group of compounds. This is clearly far less laborious than any isolation procedure.

A list of some of the substances

that have been identified chromatographically in meat extract and the colour reagents used to detect them is given in Table 2.

Confusion in nomenclature

As the early investigators isolated new compounds from meat extract they coined new names for them, and the same compound was often given more than one name. A short glossary is given in Table 3.

New compounds

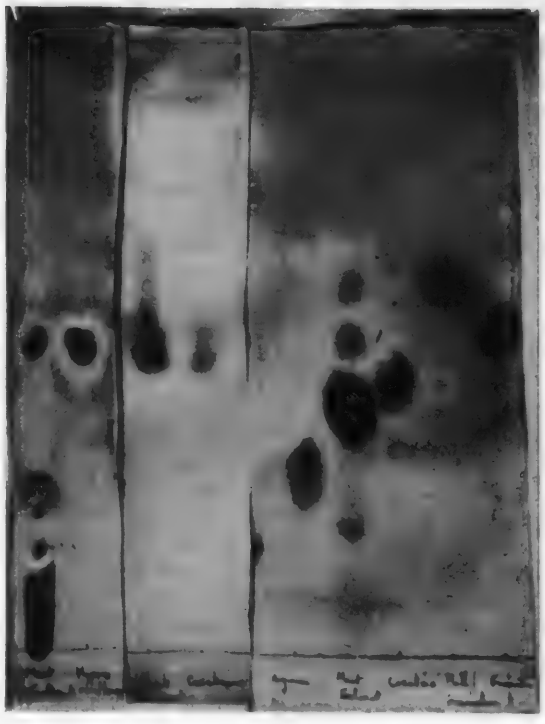
Analyses of meat extract published in the literature show that only two-thirds of the dry material of the extract has been accounted for. The nature of the remaining third is a matter for speculation and further investigation. Undoubtedly a part of the gap can be attributed to those compounds whose presence has been reported but not verified, among these phosphocarnic acid, avertabrine, γ-homocholine and crotonbetaine would seem to be worth investigating.

Siegfried's "phosphocarnic acid"

In 1893 Siegfried[10] announced the isolation of a rather unstable phosphorus-containing compound from meat extract, after removal of the inorganic phosphate with baryta.

The compound showed a marked similarity in behaviour to inosinic acid, for when a solution of its barium salt was heated the phosphorus was split off as barium phosphate, leaving a phosphorus-free nitrogen compound in solution. Siegfried isolated a white, hygroscopic, crystalline substance, freely soluble in water but sparingly soluble in alcohol and insoluble in ether. This compound was found to have the formula $C_{10}H_{15}N_3O_8$ and was given the name "fleischsaure" and its parent substance thus became "phosphorfleischsaure." Matthews[11] translated the name as "carnic acid" and the phosphorus compound as "phosphocarnic acid."

Hydrolysis of carnic acid yielded ammonia, lysine, and lysatinin (arginine). No purine compounds were detected, so distinguishing the substance from inosinic acid. Carnic acid was found to have a strong affinity for hydrochloric acid and its chloride did not react with silver nitrate. Although the formula was known no structure was assigned to the compound.



Paper chromatograms of meat extract and various pure chemical substances. Orders of samples (*left to right*): Meat extract, Hypoxanthine, Meat extract, Creatinine, Arginine, Meat extract, Creatine, Methylguanidine, Guanidine.

Over the next few years several papers were published by Siegfried and his co-workers dealing with phosphocarnic acid and its insoluble complex with iron, carniferrin. In several textbooks of the period sections were devoted to phosphocarnic acid, which was included among the muscle extractives. Siegfried's claims were not universally accepted, as some workers were unable to repeat his work. Carniferrin was regarded by some as a mixture of the iron compounds of albumoses and proteoses but with little experimental evidence.

Finally, in 1903 Kutscher and Steudel[12] published a refutation of Siegfried's claims, stating that they had been unable to prepare phosphocarnic acid and that nobody, not even Siegfried, had ever prepared such a substance. They refused to consider its existence further until Siegfried had prepared this substance before independent observers.

This challenge of Kutscher and Steudel was apparently not taken up, and Siegfried appears to have abandoned his claims as he made no further reference to the compound in subsequent publications.

Pharmacological effects

From the earliest days meat extract was claimed to be a stimulant, and even its denigrators referred to it as "merely a stimulant." Products containing meat extract, such as *Bovril*, have long been regarded as general tonics and stimulants, assisting recovery from exhaustion and fatigue. There is little precise information about these effects. It is, of course, possible that the well-known promotion of gastric and intestinal secretion and motility might cause secondary more generalised effects and result in a real or apparent stimulation, but one early report suggests a more direct influence. Kobert,[13] in 1882, injected creatine into frogs and set them to work on a treadmill. He showed that creatine improved muscular performance and produced a more rapid recovery after heavy work.

The "Carnosine" controversy

It was first shown by Pavlov in 1898,[14] in his classical experiments on dogs with fistulas, that meat extract was a powerful stimulant of gastric secretion. He tested some of the substances known to be present in meat extract — creatine, hypoxanthine, carnin (a mixture of inosine and hypoxanthine), xanthine and leucine—and found they were without effect.

Krimberg, Komarov and Korchow,[15] associates of Pavlov, administered derivatives of meat extract to dogs with pouches and fistulas and observed the effect on gastric secretion. It was concluded that carnosine was the substance responsible for the gastric stimulating properties.

Komarov isolated carnosine from muscle, purified it, and finally extracted the crystalline material with a mixture of alcohol and chloroform to remove any contaminating histamine which might otherwise have been responsible for the observed effects. Dogs with a fistula to the jejunum were injected with the carnosine and the secretion of intestinal juices measured. Intravenous injection of 0·02 to 0·04 g./kg. brought about a marked increase in secretion and intestinal activity. Subcutaneous injection gave a slower and less marked response.

It was shown that the flow of gastric juice and of intestinal juice were independent of each other, but both brought about in response to the carnosine circulating in the blood. Carnosine had the same effect on a portion of denervated intestine, hence it must act directly on the walls of the intestine.

Schwarz and Goldschmidt,[16] however, reported no stimulation of secretion following the administration of carnosine into dogs with gastric fistulas. These observations have often been quoted to disprove the work of Komarov, Krimberg and Korchow, who all claim to have observed the secretion-exciting effect of carnosine. In their experiments, Schwarz and Goldschmidt applied a 1% solution of carnosine directly to the surface of the gastric mucosa. The mode of application was criticised by Krimberg, but perhaps more important is that the dose used (0·005 g./kg.) was appreciably smaller than the minimum dose (0·02 g./kg.) given by Komarov.

Table 2
Reagents used in Paper Chromatography

Compound	*Detected by*
Amino acids	Ninhydrin
Amino acids	Giris reagent
Carnosine, Anserine and Methyl Histidine	Ninhydrin
Histidine, Carnosine and Iminazoles	Diazo reaction
Creatine and Guanidines	Diacetyl
Creatinine	Jaffé reagent
Purines and Pyrimidines	Ultra-violet light
Purines and Pyrimidines	Silver nitrate / Bromophenol blue
Urea and Citrulline	Ehrlich's reagent
Organic phosphates	Molybdenum reagent
Sugars	Silver oxide
Sugars	*m*-Phenylene diamine
Choline	Phosphomolybdic acid
Quaternary-ammonium compounds	Potassium bismuth iodide
Lactic acid	Ferric chloride
Potassium, Ammonium	Sodium cobaltinitrite

In 1927 Korchow prepared pure samples of carnosine, carnitine and methyl-guanidine from meat extract and showed that carnosine was the most powerful of the three. In addition he showed that when injected 0·14 g. of carnosine had a stronger effect than 0·0005 g. of histamine or 2·5 g. of meat extract (containing approximately 0·12 g. of carnosine). Krimberg and Korchow, a year later, obtained the same result, though carnitine was found to be moderately active.

All the aforementioned results are open to the criticism that the observed effects might possibly be due to contamination of the carnosine with small amounts of a very potent impurity. In 1925, however, McClintock and Hines[17] used both natural and synthetic carnosine. The effect on blood pressure was the same, and injection of 0·2 g./kg. into a dog had a pronounced effect on the digestive organs as evident from the resultant vomiting and diarrhœa. Unfortunately, no experiments were made on dogs with gastric fistulas. In other experiments carnosine was applied to rabbit intestines and guinea-pig uterus immersed in Tyrode's solution. A marked increase in tone and the rhythmic contractions of these organs was observed. McClosky and his fellow-workers[18] were unable to reproduce the effect on guinea-pig uterus.

McClintock and Hines state that in all of their experiments no difference was found between the effect of carnosine isolated from muscle and the synthetic material. Furthermore, complete hydrolysis under conditions which would not destroy any histamine present, did completely destroy the observed pharmocological effects of carnosine.

In an attempt to settle the matter Rasenkow, Derwies and Severin[19] (1927) took great pains to purify their carnosine obtained from muscle and they repeated the experiments on dogs with Pavlov pouches. No effect was obtained by feeding carnosine or injecting it subcutaneously, but a secretion of juice was obtained when the carnosine was injected intravenously in a dose of 0·04 g./kg. Meat extract itself was found to have a much stronger effect than could be accounted for by the carnosine contained in the amount administered; moreover, it was potent by mouth. The impurity associated with the carnosine was concentrated and its potency measured. Contrary to expectation this was found to be less potent than the same weight of carnosine.

After 1928 interest in the gastric stimulating power of carnosine appears to have died. The work of Komarov, Krimberg, Korchow, Rasenkow, Derwies and Severin and of McClintock and Hines provides evidence for an effect of carnosine on the digestive organs, and only the rather questionable observations of Schwarz and Goldschmidt were at variance with these results. The effect of

carnosine would appear to be most powerful when injected intravenously in a dose of 0·02 to 0·07 g./kg.; administration by a subcutaneous or oral route being much less effective. The possibility of the observed effects being due to impurities has been considered by most workers and suitable precautions taken. McClintock and Hines, moreover, had shown that hydrolysis destroyed the activity.

Unfortunately, the one experiment that should settle the matter, namely the injection of synthetic carnosine into dogs with gastric fistulas, does not appear to have been carried out.

Table 3
Compounds in Meat Extract

Name appearing in the literature	*Accepted name to-day*
Ignotine	Carnosine
Novaine	Carnitine (β-hydroxy-γ-butyro trimethyl betaine)
Oblitine	Carnitine diethyl ester
Neosine	γ-homocholine
Carnin	a mixture of Hypoxanthine and Inosine
Sarkine	Hypoxanthine
Glycocoll	Glycine
Inosic acid	Inosinic acid
Lysatinin	Arginine

Biochemical significance

It is possible that many of the substances in meat extract, which are of course derived from muscle, are in some way involved in muscle metabolism.

Judging from the amounts present, carnosine, anserine, and methyl-histidine would appear to play some important rôle. So far the metabolism of muscle has been more or less satisfactorily explained by the Meyerhof-Embden scheme. It is clearly incomplete, however, to postulate a series of reactions describing the processes involved in muscle metabolism if substances present in such concentrations as is carnosine are not included. Recent work by Russian biochemists[20] has now suggested a rôle for this compound. They have shown that the addition of carnosine to isolated muscle delays the onset of fatigue. Denervation of the leg muscles of a rabbit was followed by the gradual disappearance of carnosine and anserine from the muscle tissue.

Both these substances were found to appear in embryonic muscle tissue in the chick and rabbit just before birth, when development of skeletal muscle was practically complete and these muscles were ready to function.

Phosphocarnosine has been synthesised by Severin and his coworkers and found to be an energy-rich phosphate compound. It is enzymically hydrolysed by aqueous extracts of rat muscle. From this work it appears likely that one of the principal physiological functions of carnosine and anserine involves the coupling of phosphorylation with glycolysis and the synthesis of ATP. It is interesting to note that as long ago as 1895, Siegfried reported that phosphocarnic acid was considerably reduced in fatigued dog muscle.

Carnitine was found in meat extract by Kutscher in 1905, but only as recently as 1952 it was shown that carnitine is identical with vitamin B_T.[21] This is essential to the development of the meal-worm, *Tenebrio molitor*, and so classed as a vitamin. It has recently been suggested[22] that carnitine is important for the growth of young mammals and may be a component of the Animal Protein Factor.

Conclusion

As an ingredient of the diet meat extract has, with the discovery of vitamins, regained much of its lost prestige; to the biochemist it offers a new field of investigation. The substances present, in so far as they are derived from animal muscle, must all be fitted into any final scheme which covers the metabolism of muscle. It is to be hoped that when the unknown fraction of meat extract is identified it will throw further light on this problem.

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Food Chemists

SIXTY independent consultants in food technology are listed in the current issue of the Royal Institute of Chemistry's directory.* They are described as specialising in general food technology, canning, cereals, flour and bread, cocoa and chocolate, confectionery, fish and fish products, jams and preserves, meat and meat products, milk and milk products, oils and fats, sugar and molasses, whaling and whale products. Other headings include food, drugs and water, dairying, fermentation, essential oils and starches.

The directory carries altogether 189 entries.

* *Directory of Independent Consultants in Chemistry and Related Subjects.* Royal Institute of Chemistry. 3rd edn. 1955. Pp. ix+46. Available free.

FOOD PRODUCTION . . .

Complacencies and Facts—1

By Hugh Nicol

(*West of Scotland Agricultural College*)

Food shortage has often been prophesied, nor has there been any lack of cheerful reminder that such prophecies have successively proved false. In these two articles Prof. Nicol makes no prophecy but simply examines the fundamental bases on which food production proceeds, and the principles to which it must conform. Unalterable facts are shown to contrast with current beliefs. Since the chemical and microbiological principles of production and utilisation of food have not been displayed in succinct form before, these articles will help to spread the knowledge on which a judicious estimate of food prospects must depend. The principles, together with some discussion of current proposals for increasing supplies of food, will be given in the second article.

AT a meeting of the Nutrition Society in April last year, the Glasgow physiologist Prof. R. C. Garry said that there was danger in regarding food as simply fuel for a machine. To do that is, of course, to ignore the quality aspects of food.

There is much greater peril in the current fashion of looking on fuel as simply the food of machines.

People who expect that a bright future can be based on nuclear power "when all fuel is exhausted" are not taking food into account at all.

For the optimist who believes in a future conditioned substantially by "atomic" energy without much reference to fossil fuel, the unanswerable question is: "And what are you (meaning, your descendants) going to eat and wear?"

Without having a new look at his beliefs, the optimist will not be able to say that metals and clothing will be replaced by plastics and synthetics: because, like food, those are among the products derived from fuel. If in relation to production of food or clothing there is an appeal to photosynthesis or greater use of fertilisers, or some other unbalanced idea to the effect that "science" will surely find a way, that will no less surely show that the problem of future food supplies has not been seriously considered.

Weakness in policy

Much of the speculation about a coming civilisation based on atomic energy is semi-official; but the general failure to comprehend the principles on which the future of man must depend is not just a matter of political speeches made at the ceremonial opening of some new departure of atomic physics. The tendency of politicians and administrators is to take the familiar for granted, and to give an unreflective welcome to what is spectacularly new: and therefore to call upon science only when the scientific nexus is apparent to a layman. That was exemplified in the groundnut scheme which was treated as an affair of engineering, fertilisers, and administration: scientific advice about the suitability of the site for growing the desired crops was not sought because that question never arose in the minds of the laymen who conceived the scheme.

On the other hand, the scientific nexus of questions of atomic chemistry and physics is apparent even to politicians; hence those branches of pure and applied science have been taken under official notice. Moreover, unlike what has happened with the groundnut scheme and other matters relating to food supply, scientists and scientific considerations of appropriate kinds have been brought into policy-making; and there is a scamper of publicity about the principles which underlie the new developments of physics and the one-sided hopes hinging on them.

In contrast to all that is the fact that this is almost the first article to expound the principles of food production, as they are now known, to enable a sober—because knowledgeable—estimate to be made of future prospects.

Man's greatest need?

Food, clothing, shelter, and energy may be the four prime needs of man; but who, looking back over the majority of the pronouncements made in the last few years about the near and distant future, would gather that external energy ranks as about the fourth need of man and not his first? Remarkable as it may seem, the nuclear physicists and their allies have succeeded in temporarily obscuring one great truth as well as a host of lesser components of the facts about existence.

As a result, the man-in-the-street—informed from all sides about the potentialities of fission of atomic nuclei, but unaware of what makes his own organism tick—has been made conscious of two broad alternatives in which the food question does not appear. Either "the bomb" will be used to wipe out a large proportion, or all, of mankind; or it will not be so used, and man can look forward to an easeful future in which (thanks to an increasing application of science) there will be plenty

for all. It may be added that if "the bomb" is used to wipe out only a few hundred millions (those being mainly the more technically progressive peoples) it may to that extent make existence easier for the survivors.

Assuming that "the bomb" is not used, anyone who has the idea that a peaceful future is necessarily assured from an unlimited development of "science" (meaning, presumably, physics and engineering) has got the eel of science by the tail. Science in the round can indicate the principles of existence, so as to point out how conflict can be minimised. It must be admitted that that mild statement has much less appeal than the vague but unscientific ideas currently being put out from some of the highest places.

Photo: "World Crops."

Food production by modern means. We depend increasingly on fossil fuel as an indispensable aid to food production, and stocks of this fuel are dwindling, warns Prof. Nicol.

Quicker grasp needed

There is a striking contrast in the time needed for appreciation of the basal problems of food and new forms of physical energy. Though the concept of power from nuclear fission is generally dated from the trials with a small atomic pile about 1942, the development of atomic chemistry and physics really goes back to the discoveries of H. Becquerel and the Curies sixty years ago; the concept of isotopes dates from 1912. Modern nutritional chemistry is practically contemporaneous with the early development of radiation chemistry: experiments on accessory food factors were being made while the Curies made their first attack on the problem of radium. The last thirty years have seen marked advances of knowledge about qualitative nutritional requirements (vitamins; essential amino-acids); but knowledge of some facts—such as about the necessity for having protein to "balance" the intake of non-nitrogenous constituents — goes back a hundred years or so; and indeed the quantitative outlines of human and animal nutrition and of crop husbandry have not changed essentially for fifty years.

The notion that "science" is likely to help in securing much more food in the near future will be a pipe-dream unless action is taken on factual lines: notably on the premisses that people are chemical entities, that it takes a chemical to make a chemical, and that no form of external energy is able to secure more than a limited amount of food consistent with few amenities and what would today be called an uncivilised standard of living. The facts are that you can eat horse, but not horsepower. No scientist can do anything to change that state of things. *Ex nihil nihil fit.*

Muddling through

That we have "muddled through" in the last hundred years is due to the circumstance that by trial and error we have managed to cover nearly the whole cultivable land with agricultures based on leguminous plants and their nodule bacteria. In recent years this has been achieved, for the most part, on land previously uncolonised; that it has been done without understanding of the processes concerned—for example, with the idea of cultivating plants rather than nodule bacteria—has in no way diminished its effectiveness. Much of the expansion of growth of legumes—and consequently of animal products—occurred before all the governing scientific principles were known; but there is no reason to expect that any further increase, in parallel with the expected increase of population, can be achieved except by knowingly encouraging microbes and plants to behave in such ways as to produce the needed food.

To do that, leguminous crops must be grown, and fuel burnt to support that growth, on corresponding scales. Where increases of agricultural output have been achieved without leguminous crops (as in parts of North America) social disequilibrium and soil deterioration have necessarily resulted within a few years. The mere growing of legumes will not, however, offer freedom from disturbance unless the present situation is viewed with complete understanding. Self-contained empiricism can no longer deliver the goods.

A hint about rapidity of change on the food front is given by the fact that within a short lifetime three countries—the United States, Russia, and India—have virtually ceased to export food, and Argentina has reduced her exports.

Historians have neglected the

gist of the recent history of food production, while other features of modern life have not lacked exposition and explanation. The present and future dependence of the technically-advanced peoples on fuel for food and therefore for keeping their population in its present numbers, or whatever numbers the population may come to have, is comparable with, and has been closely contemporary with, the development of the aeroplane. The first free flight of a heavier-than-air machine was in 1903; the main sulphur deposits were opened about 1904; both the aeroplane and the demand for fuel-for-food began to be important about 1925. The optimist sees helicopters on every roof, and rockets and artificial satellites buzzing about space; but, however heedless one may be about consumption of fuel or the relative importance of food and flying, nobody has seriously suggested that aeroplanes and similar devices can be powered without fuel. That distinction is reserved, apparently, for the human organism enjoying the blessings of nuclear energy.

Fallacies about photosynthesis

What of photosynthesis?

(A) Has it not always been the means of producing food?

(B) Is it not the prime example of transforming external energy (of sunlight) into wood and fibre (for fuel and clothing) as well as into food?

The next question is obvious:

(C) Isn't it reasonable to suppose that some scientific advance will make it possible to increase the photosynthetic output to meet all probable demands; since the quantities of carbon dioxide (and of nitrogen) in the air far transcend those likely to be needed by man?

Question (C) can be left; it will answer itself when (A) and (B) have been dealt with.

(A) is really several questions. The strict answer is No. Like other questions arising out of misinformation or misapprehension, (A) needs much more space and time to answer than to utter. It is a mistake to suppose that large plants of the types found wild in forests, or used by man to give food to himself or his livestock, support themselves by photosynthesis alone. Photosynthesis works solely with carbon dioxide and water—that is to say, upon the elements carbon, hydrogen, and oxygen only. All plants, and all the animals which feed on them, require nitrogen and sulphur as well; and with rare exceptions the nitrogen in compounds built into microbes, plants, and animals—that is to say, all living matter—must have undergone the energy-consuming process of being reduced by being combined with hydrogen or its equivalent. The same is broadly true of sulphur. With these expensive processes of reduction of nitrogen and sulphur, photosynthesis has nothing to do directly; yet animals cannot live without a ready-made supply of the resulting compounds.

Microbes essential

The element nitrogen is supplied to animals (including fish and man) through the agency of micro-organisms with or without the intervention of large plants. Thus photosynthesis, without participation of micro-organisms, never has been a means of producing food; and, though the circumstance has only lately been realised, man has always been, and still is, dependent on the day-to-day activities of micro-organisms for all the food he eats. The only possibility of man's not depending wholly on the activities of contemporary micro-organisms comes by producing food synthetically: by a direct, instead of the prevailing indirect, appeal to fossil fuel.

These considerations show that (B) is unfounded. Nor is the "always" quite correct in (A). Even if the idea of food being made by photosynthesis is amended to include the rôles of micro-organisms in putting nitrogenous foodstuffs within man's reach, the question shows a historical misapprehension.

The belief that renewable natural agencies (let us say) have "always" produced food is nearly correct, since it would represent with substantial accuracy the state of things for all people up to fifty or sixty years ago. It still represents the state of things for much the greater part of the world's population: that is, for all except the technically-advanced peoples and those who depend on them. To anyone who holds the belief that photosynthesis and cognate annual activities have always been the sole support of agriculture and fishing, it may be natural to suppose that a similar state of affairs will indefinitely continue, since no change can be expected in the sorts of nutrients the body is able to deal with. To feed more people, then, all that is needed is to step up photosynthesis and the rest, so as to keep step with the population.

Microbes and fuel

But how? That is a problem of which the chemical aspects have been attacked empirically by using fertilisers on a large and increasing scale during the last two generations; its solution is also being sought along such lines as artificial cultivation of microscopic algae. All these successful or projected attempts have two features in common besides their recent onset: they mobilise micro-organisms, and also the fossil products of micro-organisms. The latter is equivalent to saying that the burden of feeding the civilised peoples has increasingly been shifted on to consumption of fuel to produce food (and other consumables of plant origin).

Hence, what is of the utmost importance for understanding "the shape of things to come"—the practical answer to the question of adequacy of food-supplies and therefore of all the rest—is to see correctly the almost unrecognised novelty introduced into production of food during the last few decades. This is: that a substantial proportion of people born this century have ceased to depend wholly for food on what can be gained from the everyday natural actions of sun, wind, and rain acting upon soil and sea.

Food production as practised by more than half the world. Will this become the standard for the "civilised" races?

In the name of progress and in the search for more food, some peoples have come to rely increasingly on fossil fuel as an indispensable aid to production of food.[1] For those peoples, there can be no going back except at a terrible price. These peoples who use fossil fuel to produce food are mainly the white races, the Japanese, and the Koreans; the others are still for the most part in the "primitive" state of relying on renewable natural agencies for such food as they can get. The standard of life of these others does suggest a model of what ours may revert to when fuel becomes insufficient to satisfy developed nutritional needs.

In sum, human nature has not changed; human metabolism is not likely to change; but the relation of man to his world has changed significantly since man began to make large inroads into stocks of fuel.

All invention is based on fuel

In his pride at having invented machines, chemicals, and means of communication, technically-civilised man has effectively forgotten that the whole of this modern "conquest of nature" is founded on consumption of fuel. True, concern has often been expressed about fuel reserves in relation to production of mechanical energy; but with the nuclear age in sight, a dwindling of fuel reserves has come to appear less important to many—or even unimportant. It has been suggested that those undeveloped countries which possess large fuel reserves could pass straight into the nuclear age, leaving their fuels for ever in the ground; but that is just one of the careless ideas about man's biological needs and the relation of man to irreplaceable materials.

If supplies of fuel (and ores) become short, not only will "progress" be arrested but a contraction, or a reversion to earlier practices, can be expected. Whether or not aeroplanes and steamers are replaced by sailing ships: production of food, and of other materials derived from biological processes in and on the soil, is bound to suffer unless the condition for progress is better understood than it now is That can be illustrated by a couple of examples.

Apologists for progress frequently cite tractor cultivation as one of the boons brought by mechanical ingenuity. Animal traction consumes products of the land; the proportion of farm output that is consumed by animals working on the farm is fairly high: about a seventh. Replacement of animals by tractors and other mechanical devices has released land for production of fibre or food; and that has been cited as one of the most striking causes of increase in agricultural output. The advantages are apparent. What has been lost from sight is that they were gained by consumption of fuel: by a shift from consumption of annually-renewable materials to consumption of a dwindling stock: from income to capital.

Neglecting fuel used for fertilisers (and that was a quite small tonnage before mechanical cultivation became important), a food economy which was balanced with renewable resources and with a smaller population has been transformed into one temporarily at a higher level but kept there by consumption of non-renewable substances. In such purely mechanical aspects of food production an application of electricity is possible, though not yet seriously considered; the example is cited as an instance of lack of thought about fuel in relation to progress so far.

A second example is the growth of the artificial fibre industries. In

[1] The sulphur or other fuel is not necessarily all burnt or consumed in the country which eats the food grown with its aid. The United Kingdom uses fuel to make fertilisers for its own agriculture; but since that feeds only about half the United Kingdom population, a large proportion of the protein eaten in the United Kingdom is attributable to fuel consumed in New Zealand, Australia, Holland, Denmark, and other contributors to the food supplies of the Kingdom.

recent years the total output of fibres from agricultural and artificial sources has increased faster than the population—the implication being that but for the advent of synthetic and other fibres, there would have been a shortage of clothing, since agricultural production of fibre has not kept pace with population. This extra clothing and cordage has been obtained by spending fuel capital as income. Plastic fibres are made directly from fuel; the others (those based on wood are examples) involve consumption of sulphur or other fuel in processing them.

Though the artificial fibre and other plastics industries consume a notable fraction of all the fuel used in production of chemicals and food, the total tonnage of fuel used for plastics is still relatively small: output of plastics is measured in millions of pounds, not millions of tons.

An awkward situation

We have arrived at contemplation of the uncomfortable position that transport, space-heating, manufacture of chemicals (with few exceptions) and other common applications of fuel are all in competition with use of fuel for production and preparation of food. The mechanical uses of fuel in connection with food—as in propelling fishing vessels—may conceivably be replaced by energy derived from nuclear power; but clearly much thought will have to be given to actualities and tendencies if agriculture and the food and chemical industries are not to be squeezed by a deficiency of fuel.

In other words, the size of population which can be fed at any time and by any means within the next few hundred years will depend greatly on what is done within the next few decades. Much wisdom will be needed within and outside the food industries; and it is requisite that a knowledge of the main facts and implications of food chemistry should not only be widespread but reach a high level.

The rate of fuel usage—mainly for non-chemical purposes—seems to be increasing. The limit of "progress" based on consumption of fuel may not be reached for fifty years or more. To whatever stage technological development has been brought within a hundred years, the main question before then is likely to be whether there is going to be food enough in view of previous dissipation of materials used to produce food. If that question becomes urgent, a contented and peaceful world is not likely, and the "atom bomb" may, after all, solve the question successfully. As Sir Winston Churchill said at the Jubilee of the Massachusetts Institute of Technology, if a food shortage does come "there might be some very sharp disagreement about how the last crust was to be shared."

That is an unnecessarily picturesque way of putting it. There will always be some food, equal to what man can conjure out of renewable natural resources, and therefore sufficient to sustain a world population of about the size of that of last century; or probably an even larger one at a Chinese standard of living. As the presumed increase in the population of China during the present century may suggest, renewable resources could sustain a population larger than that of the 'nineties, but at the cost of much misery (including liability to famine and disease) and of political strife inside and beyond the countries directly affected. Modern drugs and other chemicals for combating disease and pests represent advances purchased by consumption of fuel; and, like other such outcomes of progress, cannot last longer than fuel is available.

On reviewing the whole situation, it is evident that the idea that we are well on the way to the conquest of disease and famine is hardly consistent with the long view, unless ideas about allocation and disposal of fuels undergo a change of which there is no indication. The probable picture is not of disagreement in some remote future over the last crust, but of more immediate and inescapable disagreement about sharing the last untapped reserves of fuel. It would be beyond the scope of this article to discuss whether that disagreement might arise out of concern about supplies of food, or over the desire to have more helicopters or bigger rockets. In any event, a squeeze on food, and threat of a reduction of population among the technically-advanced peoples, must be an outcome whenever fuel supply becomes insufficient for all desired applications.

Essentiality of nitrogen

Fuels are what chemists call reducing substances; energy is obtained from them for machines by setting the fuels to combine with (reduce) atmospheric oxygen. In animals, metabolic energy and heat are similarly obtained by oxidation of carbon and some of its attached hydrogen in foodstuffs—which may be called suitable types of organic compounds. In the growth of green plants, atmospheric carbon dioxide is reduced by photosynthetic attachment of some hydrogen atoms to the carbon. A further consequence of growth of plants and microbes is the formation of actual ammonia (available to plants) and of reduced nitrogen in the form of $-NH_2$ and $>NH$ groups attached to particular carbon groupings: especially the amino-acids.

In general, animals cannot make use of other forms of nitrogen than what has been reduced and organically combined into proteins, amino-acids, and the like, including choline; and again in general, such amino-acids, or the vitally important carbon and sulphur groups they contain, are formed only by plants. Organically-reduced nitrogen, then, is essential to animals; but animal energy does not appear to be obtained by oxidation of hydrogen attached to organic nitrogen. Some of the organic nitrogen of foodstuffs is used for body-building and repair; any excess is excreted as fully-reduced nitrogen (ammonia) or, more commonly, in the forms of such partially-reduced carbon compounds as urea $CO(NH_2)_2$ and uric acid.[3]

[3] Hydrogen attached to nitrogen (*e.g.*, $-NH_2$) is not oxidised by the body. If not built into the body or embryo it is excreted after further reduction to ammonia, or in the form of urea and related compounds containing partially oxidised carbon. It will be

The greater part of this "wasted" nitrogen, and of any nitrogen used for animal growth and reproduction, represents the reduction performed by micro-organisms at some possibly quite distant stage of the cycle of plant-growth and food production.

Whilst carbon and hydrogen useful for purposes of animal energy can be combined by photosynthesis, a sufficiency of protein is ensured only by going back to the micro-organisms concerned in manipulation of nitrogen. The majority of crop plants and of other large plants such as the trees of British forests receive no help from micro-organisms towards nitrogen supply and protein formation except what the microbes do in turning over the existing stock of soil nitrogen remaining from earlier living matter. Such crop plants (sugar-cane, cereals, potatoes, and oil palms are examples) are relatively poor in protein, but contain and yield a large proportion of nitrogen-free carbohydrate, and sometimes, oil.

Balancing a diet

This is where the food problem assumes both a quantitative and a qualitative aspect which cannot be further simplified. In order to live, animals require a certain proportion of protein in their diet. The cereals, potatoes, oil-palms, trees, and other large plants constituting actual or potential crops yielding an excess of starch, sugar, or oil are relatively easy to grow, with or without consumption of fuel for making fertilisers to boost yields.

The proportion of protein in such crops is too small to provide a balanced diet: that is (crudely) a diet containing an adequate proportion of protein. Growing more plants of these protein-poor kinds, and eating more of their produce, does not help; the non-protein nutrients from any source must be balanced by eating other foods which contain a sufficiently high percentage of digestible protein not just to balance their own content of carbohydrate and oil, but also to make up for the nitrogenous deficiency of the rest of the diet.

These protein-rich sources fit for balancing a diet mainly consisting (as far as bulk or weight is concerned) of cereals and other predominantly starchy foods are of only two kinds—one from the sea, the other from the land. These are fish and leguminous plants. Meat in the quantity lately available—a quantity greatly increased during the last fifty years or so—need not be specially considered, since most of it is derived from cultivation of leguminous crops similarly augmented during that same period.

Central position of legumes

Leguminous crops derive some of their nitrogen from the soil in just the same way as other plants do. The extra nitrogen which goes to make leguminous crops peculiarly rich in protein is gained through the activities of specialised bacteria which live in little swellings, called *nodules*, on the roots of the plants. Within the nodules, these bacteria seize on nitrogen in the air (it is, of course, necessary that the soil should be permeable so that air can reach the roots) and convert that elementary nitrogen into other substances which the leguminous host can build up into protein or substances which can serve an animal as well as protein does. The atmospheric nitrogen "fixed" by the nodule bacteria of leguminous plants is the source of virtually all the natural or cultivated protein obtainable from the land to balance the excess of carbohydrate and oil of other food plants; that is true whether the legumes are eaten directly as pulse by man or animals, or indirectly in the form of meat, milk, or eggs. No process able to substitute or replace this biological fixation of nitrogen and its transformation into edible protein is known.

The great increase in production of meat and the vast extension of farming in the "new" countries and elsewhere during the past fifty or sixty years has been based on a corresponding expansion of cultivation of legumes carrying the invaluable nodule bacteria. This new cropping, and the increased protein it has brought, have been sustained by a corresponding increase in the amounts of fuel burnt to make fertilisers; of these fertilisers, the phosphatic types have been the chief, and the fuel used has accordingly been mostly sulphur to make superphosphate. It is probably unnecessary to go further into agricultural detail; the case for fuel as a seemingly indispensable ingredient of the food situation can rest with this citation of the close connection between fuel usage, bacteria, and amounts of protein available to man. It should, however, be added that burning of sulphur is not indispensable for the welfare of leguminous cropping; coal could replace sulphur, but at extra cost and inconvenience.

A condition for survival

Analysis of the outlook for food production leads to the postulate that the population of tomorrow is limited according to the degree of success that is achieved in continuing to encourage, or provoke, micro-organisms to produce protein (together with a sufficiency of fat and carbohydrate). Further analysis would discriminate between the relevant expectations and possibilities of the white races and others in relation to food and also to standards of living.

The problem of inducing micro-organisms to make large quantities of protein for us is not one for the distant future; it is with us now, and has to be solved next year and all the time. That it has not been recognised earlier as a problem is a consequence of the facts that soil microbiology is a relatively new science hardly older than radiochemistry but much less fashionable—in spite of the seniority and greatness of the industries built on it.

However, there is nothing intrinsically difficult in learning about the relation between

seen that urea and related compounds represent a loss of carbon which, if it had been fully oxidised to carbon dioxide, would have yielded more energy. The metabolic energy-relations of nitrogen are exacting, peculiar, and little understood.

microbes and food production, or the nutritional needs for protein and carbohydrate. The facts are given in a pass degree or diploma course in agriculture; and the relationships between them can be understood by everyone having a normally good education.

Along with the Japanese and the Koreans, the white peoples have thus far sufficiently managed to encourage the right kinds of micro-organisms that, in peace time, their rising populations have hardly felt the pinch of shortages of the right kinds of food. This ability to keep food supplies balanced in quantity and quality has been won by consuming fuel: partly by mechanical means applied to fishing and cultivation, and partly by chemical modes for biologically assisting growth of plants and micro-organisms on land. The modern significance of leguminous plants in agriculture, together with the consequent significance of fuels for food production, are parts of modern civilisation.

The essence of the problem

The condition of equilibrium for a growing human population is that man shall be able to foster micro-organisms to the extent of always having a nutritional sufficiency of nitrogen organically combined in acceptable edible substances. Still more briefly, the main question which man has to solve is the problem of behaving wisely towards the soil bacteria.

Assuming land enough (a large question in itself) man can expect to remain in balance with himself only so far as it is possible to continue to perform the trick acquired this century—namely to ensure an annual harvest of both protein and non-protein foods in quantities broadly ample for the growing populations, and in the proportions which can maintain life.

The essence of the food problem is, therefore: How can practical encouragement of the legumes and their associated bacteria be kept in step with an increasing population in face of a diminishing stock of sulphur and other fossil fuels?

Light on the Vitamins

MANY chemists associated with the food or pharmaceutical industry, or working in or on the fringe of the medical field, will have been asked at one time or another by their non-scientific friends where authentic information can be obtained about the vitamins in a form that is neither so elementary as to be useless, nor yet so technical as to be incomprehensible.

Dr. Harris's book,* now available in its 4th edition, seems to be the answer. Written in simple idiomatic English that avoids all the extravagances of journalistic writing on the one hand, and the cumbersome jargon of so many scientific papers on the other, it makes the subject of vitamins a fascinating, even dramatic story. It is indeed refreshing to find a scientist who can present his subject with so much charm and clarity, and with that personal touch that only comes from having played a part in the unfolding of the story, and from having known personally many of the leading actors in the drama. Nor is Dr. Harris above garnishing his tale with a few well-chosen quips and anecdotes.

The author is, of course, well known for his researches into methods of vitamin assay: his work helped to distinguish certain members of the vitamin B complex from one another in the days when the picture was extremely confused, and was of still greater importance in helping to determine the value of foodstuffs as sources of one or the other of vitamins, and in assisting clinicians to determine the presence of vitamin deficiency by more objective and reliable methods than those available at the time. Dr. Harris is primarily a nutritionist interested in seeing that the vast store of knowledge about vitamins accumulated in the last few decades is used for the benefit of those who need it most. The first edition of his book was published in 1937 and the last chapter of the present edition gives some striking illustrations of the progress made since that time, most of them the result of changes introduced by the stress of war—the introduction of the "nutritionally superior wheatmeal loaf," the dissemination of information on methods of cooking vegetables to conserve their vitamin C, the compulsory reinforcement of margarine with vitamins A and D and the provision of cod liver oil, concentrated orange juice and blackcurrant purée for babies and expectant and nursing mothers. Dr. Harris ends this final chapter by a consideration of common faults in nutrition, faults that nowadays arise not from lack of scientific knowledge, but from failure to apply that knowledge. If this book could be put into the hands of dieticians, food technologists, canteen managers and those in any way concerned with the administration of ante-natal and baby clinics, and school meal services, perhaps the nutritional status of the population could be elevated beyond the level which used to be known as normal and which, as Dr. Harris points out, we now know to have been only average.

Having perhaps illogically dealt with the last chapter first, we may now glance at the main body of the book. After a preliminary chapter on vitamins in general, the chapters that follow deal in turn with each of the older vitamins, those in fact which are of the greatest significance in human nutrition, and then in three quite short chapters brief mention is made of the other vitamins which are of less importance from this standpoint. In each instance the aspects emphasised are the nature of the disease in man and experimental animals resulting from the particular vitamin deficiency, methods of measuring the vitamins in foods, methods of measuring the nutritional status and the mode of action of the vitamins. Other aspects of the subject are considered only in so far as they are necessary to an understanding

(*Turn to page 243*)

* *Vitamins in Theory and Practice.* By L. J. Harris. Pp. 366 incl. index. 4th Edition. Cambridge University Press. 1955. Illus. 35s. net.

1,500 Gal. of Cream Becomes 2½ Ton of Butter in Two Hours

SOUTH WALES' NEW CREAMERY

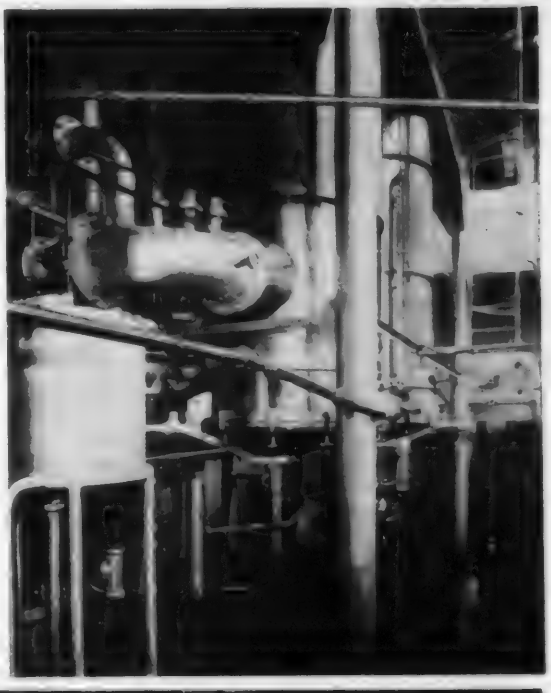
EXTENSIONS to the Milk Marketing Board's creamery at Felin Fach, Cardiganshire, which will enable dairy products to be manufactured on the spot, were opened last month by the Home Secretary and Minister for Welsh Affairs. The creamery first handled milk in 1951, but production rose so high that it has now been enlarged and equipped to convert all milk received from Cardiganshire producers into butter, cream or spray-dried powder, as required.

Milk is collected daily from up to 3,000 farms and chilled to 40°F., or below. Milk for manufacture is delivered to the new first floor extension where it is heated to 120°F., for the cream to be separated in six enclosed machines. The separated milk then returns to one heat exchanger whilst the cream passes through a second for pasteurising and cooling. A vacuum process removes feed flavours from the cream, and automatic control maintains uniform treatment.

Two of the largest butter churns in the country—each turning 1,500 gal. of cream into 2½ tons of butter in 2 hr.—are used in the new creamery. The butter is conveyed to a bulk packing machine from which it emerges in solid blocks which are covered with parchment and sealed into 56 lb. cartons.

1,800 gal. of milk per hr. is condensed into 360 gal. This enters the spray drying chamber as a fine mist and is dried by hot air. The swirling action of milk and hot air dries out the remaining water in the condensed milk. The milk powder falls to the bottom of the spray drying chamber and is blown by cold air through ducts into paper sacks or tins.

General view of the new M. M. B. Creamery at Felin Fach.



Part of the evaporating plant which deals with 1,800 gal. of milk at a ratio of 5:1.

Two of the largest butter churns in the country.

Trace Elements in Food—2. FLUORINE

By C. F. M. Fryd, B.Sc., A.R.C.S., A.R.I.C.

(*Department of the Government Chemist*)

The second article in this series by members of the Department of the Government Chemist describes the analytical procedures used in the Department to detect the presence of fluorine in foodstuffs—a task which food analysts are more frequently called upon to perform now that the role of fluorine as a necessary trace element has been firmly established.

THE determination of fluorine in foodstuffs, at one time a procedure used only occasionally when some suspicion of accidental contamination arose, has within recent years become one of frequent use and even of major importance. The role of fluorine in the protection of the teeth from caries[1, 2] is now well established and its provision as a necessary trace element having fairly well-defined upper and lower limits in any diet of choice is receiving much attention[3]; in consequence the food chemist is frequently called upon to determine this element at levels ranging from say 0·1 to as much as 100 p.p.m.

Principles of analysis

For the food chemist the examination of a sample for fluorine requires firstly that the fluorine shall be fixed in solely inorganic material, usually by ashing with $Ca(OH)_2$. The fluorine so fixed is then isolated in the form of a soluble fluoride; this is customarily carried out by some modification of the Willard and Winter[4] process of distillation from perchloric acid. In the solution so produced fluorine is determined either by titration at a fixed *p*H with standard thorium nitrate (by which it is precipitated as the extremely insoluble thorium fluoride), or by taking advantage of the disappearance of colour which occurs when fluoride is added to a solution of a coloured lake produced by the interaction of zirconium and certain dyestuffs (such as alizarin, dihydroxy-anthraquinone, or purpurin, the trihydroxy derivative) in strongly acid media. The discharge of the colour is due to the removal of zirconium from the lake as it is converted into ZrF_6 by the added fluoride.

Sampling

Experience in the Department of the Government Chemist is that samples containing in total (not per determination) less than about 5 micrograms of fluorine will not afford results to which much confidence can be attached. Samples containing more than this can be chosen of such size as to ensure full representation of the bulk supply, aliquots being taken at a suitable stage. At the Willard and Winter distillation stage the quantity of fluorine as element should not in our experience exceed 3-4 mg., if contamination of the glassware by fluorine compounds is to be avoided.

Solid samples and those of an oily nature may be transported in stoppered glass bottles. Aqueous samples, preferably made slightly alkaline at the earliest possible stage, are best carried in polythene bottles. Rubber washers should be avoided.

Preparation of the sample

(*a*) Selection of representative portion and preliminary treatment.

As fluorine is rarely present in organic material in a readily volatile form, almost any of the usual methods of drying, grinding and mixing may be used. Liquids, including oils and fats, should be mixed simply by shaking, warming if necessary to the fully liquid phase. Substances containing fatty and non-fatty material are best treated in some form of mill until a smooth emulsion is produced, distilled water being added if necessary.

Samples consisting almost entirely of carbohydrates or proteins, fibrous materials, and aqueous solutions, should be treated with a minimum quantity of a suspension of calcium hydroxide, dried, and ashed cautiously at first and finally at 500°C. Fatty samples, since they are difficult to ash without loss of fluorine and dangerous to distil with $HCLO_4$ should be treated with silver sulphate (about 1% by weight of sample) to fix any chloride present and then distilled with 1:1 sulphuric acid in the presence of three or four glass beads, adding water as required to keep the distillation temperature at about 135°C.; and the same procedure is a useful preliminary when dealing with samples likely to have a high phosphate content, because of the perceptible volatility of interfering phosphoric acid. The distillate, after oxidation with hydrogen peroxide, should be treated with a suspension of calcium hydroxide, dried, and ashed as before.

In exceptional cases as, for instance, when a volatile fluorine compound is known or suspected to be present, it may be necessary to break down the compound to a simple inorganic form by treatment with a strong oxidising agent in the presence of an alkali metal salt (*e.g.*, sodium peroxide or fuming nitric and sodium nitrate) in a bomb or micro-Carius tube. In such cases the whole bomb or tube and its contents must be taken for treatment; very considerable difficulty may be experienced in ensuring that all gaseous products are duly absorbed, and in particular it will normally be necessary subsequently to crush and transfer to the distillation flask the Carius or other glass or silica container,

The Willard and Winter distillation apparatus as used in the Department of the Government Chemist.

since fluorine may very well be fixed thereon as fluorosilicates. Platinum ware may be washed out thoroughly with hot dilute sodium hydroxide; the use of potassium hydroxide or other salts should be avoided because of the relative insolubility of the perchlorate formed at a later stage. If for any reason potassium compounds cannot be avoided the time taken by a preliminary distillation from sulphuric acid in the presence of three or four glass beads is usually well worth while.

Procedure

The procedure, both general[4, 6, 7, 8] and as it concerns some special samples[9, 10] has been fully described in the literature. The modifications used in the Department of Government Chemist are as follows:

(*a*) *Distillation stage:* The ashed sample is introduced into a round-bottomed distillation flask (provided with a short side arm and with a stopper carrying a thermometer and a capillary tap-funnel) with some 20 ml. water, two drops of silver perchlorate and three or four soft-glass beads (found by us to be preferable to the "Pyrex beads" favoured by some authorities, which may introduce boron compounds). To the side-arm of this flask should be connected a straight Liebig condenser leading to a receiver containing two drops of 0·1 N sodium hydroxide and two drops of phenolphthalein. There is no objection to the use of a rubber stopper for connecting flask and condenser; indeed, this has been found to give far less trouble than the all-glass connection sometimes favoured. Twenty ml. of 60% perchloric acid are then added to the flask and distillation commenced, water being added through the tap-funnel as required so as to maintain the temperature of the liquid, beneath the surface of which the thermometer bulb dips. It is convenient to provide the tap-funnel with a constant level device such as an inverted flask to avoid over-frequent manipulation of the tap; and if the funnel terminates in a sharpened end about 1 cm. above the surface of the boiling liquid, the rate of addition of the water can be adjusted fairly readily. Care should be taken to keep the temperature of the liquid between 136° and 140°C.; the higher figure should never be exceeded, particularly if the thorium nitrate finish is to be used. From 75 to 200 ml. of distillate should be collected; the higher figure is adequate for the recovery of 4 or 5 mg. of F.

An apparatus has been recently described[11] in which the distillation is carried out in a flask heated by a coil of about 100 watts consumption wrapped round the lower part of the flask and controlled by a thermostat enclosed in glass and immersed in the perchloric acid solution. The necessary water to keep the perchloric acid sufficiently diluted is added as steam.

A slightly different procedure in which distillation takes place in an all-glass apparatus and the necessary water is added as steam passing into the liquid phase, is also in use in the Department. In either case, the use of unused apparatus is avoided, blanks and the solution of unwanted boron compounds being minimised by the use of well-used distillation flasks.

(*b*) *Estimation:* The extension of the thorium nitrate titration finish down to the 1-5 microgram level[9] has been accomplished by the gradual overcoming of certain difficulties. Leaving aside for the moment the question of obtaining a sufficiently low blank, the larger aliquot required to give reasonable titrations with small amounts of fluorine introduces a relatively large amount of neutralised salts —carbonates and perchlorates— inseparable from the process of distillation; as the colour change on titration is at its most sensitive when the buffer solution added is reduced to the minimum, this variation with the size of the aliquot in the quantity of neutralised salts introduced causes a departure from the exact stoichiometric ratio. The difficulty has been obviated by using an internal standard for every such titration; after the first titration additions are made of, say, 5 and then successively up to 10 or 20 micrograms of F. in standard solution. An intercept on a graph then constructed enables the amount of fluorine responsible for the first titration (down to 1 microgram including blank) to be estimated with a repeatability of about 0·2 microgram with the use of laboratory 50 ml. Nessler tubes, when the sample and standard colour are matched by eye. It is

probable that the method is capable of improvement by a further order by the use, for example, of special Nesslers of smaller capacity or a suitable spectrophotometer, but this would certainly not be justified unless the laboratory blanks, which can be from 1 to 5 micrograms, were first substantially reduced.

Some special precautions

(*a*) *Reagents:* The provision of fluorine-free calcium hydroxide is a difficulty commonly met with; low-fluorine calcium carbonate or hydroxide may be dissolved in excess perchloric acid and heated with a few glass beads until fumes appear, thus eliminating fluorine as hydrofluorsilicic acid. From this, calcium hydroxide or the carbonate may be precipitated by the addition of sodium hydroxide, or carbonate, washed thoroughly by decantation and dried or ignited. Obviously, low-fluorine sodium reagents are necessary.

Perchloric acid is apparently not available in this country with the guaranteed low-fluorine content which its frequent use for the Willard and Winter method would seem to demand. Our experience is that up to 1 p.p.m. may be found in some batches of reagent quality and our practice is to mix a stock of about 1 litre and take portions of about 200 ml. at a time to a temperature of about 145°C. in the presence of glass beads, holding it at that temperature for about 10 min. by the controlled addition of distilled water. The fluorine-reduced acid thus produced is stored in used bottles reserved for that purpose. Distilled water, besides being fluorine-free, should also be ammonia-free when used in the final stages of the thorium nitrate finish, since traces of ammonia change the alizarin S indicator from yellow to purple; for the same reason bottles of ammonia are best kept out of the laboratory. Some care should be taken to ensure that reagents are not kept too long; in particular part-empty containers of dilute thorium nitrate are liable to a loss in strength possibly due to hydrolysis of the extremely dilute solution when dried on the upper part of the vessel.

(*b*) *Apparatus:* The use of new glassware should be avoided in all fluorine analysis. The extraction of perceptible quantities of fluorine from glassware must be guarded against in the storage of reagents as well as in the distillation process. Trouble is minimised by the use of polythene bottles, or failing that of glass bottles washed out with hot dilute sodium hydroxide solution and used continuously for the same reagent. Similarly, condensates and standard solutions of fluoride should be kept faintly alkaline and preferably in polythene; 24 hr. or so is the maximum for which solutions, *e.g.*, in graduated flasks, should be kept in glassware. Any glassware so used should be well washed with water and sodium hydroxide solution, and acid before being considered free from fluorine. Platinum ware is occasionally contaminated with fluorine. Heating to redness should follow washing with dilute acid.

(*c*) *Procedure:* Here one special precaution is of extreme value; the whole of the condensing surface must be thoroughly washed down into the condensate at the end of every distillation. Closing the end of the condenser with a finger, filling up the condenser with water, and emptying into the condensate is recommended; preferably the process should be repeated. Many cases of "incomplete recovery", and "contaminated glassware" have been traced to a neglect of this precaution. For this reason, the use of a plain Liebig condenser is almost essential.

(*d*) *General laboratory cleanliness:* Except as traces in reagents and in the form of HF, fluorine is not expected to occur in many laboratories. The analyst should, therefore, guard against its introduction in an unsuspected form as rat or insect poisons, some of which contain fluorides or fluorsilicates in high proportion.

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For Shareholders

THE "baffling intricacies of the balance sheet" are clearly explained in a book intended for the small casual investor.* Without attempting to act as a guide to the stock market it aims to give the reader the basis of a real understanding of the "form" that governs prosperity or decline.

Many readers of FOOD MANUFACTURE are probably only too well aware of the complexities of company finance, but only the professional financier or accountant could fail to glean something fresh from Mr. Wood's lucid dissertation. It should be of special interest to chemists who may find themselves launched on to the unfamiliar ocean of company management. The author claims to lay bare the workings of many matters that accountants often imply are only comprehensible to themselves. Reserves, bonus issues, rights, dividend yields and so on are all examined and described.

* *Simple Guide to Shareholding and Company Accounts.* By John Wood. Putnam. 1955. Pp. 130. 9s. 6d. net.

"Packs" is the title of a lively house magazine re-started by Hunt Partners Ltd. The issue comes out in the 84th year of the company's life. Those years have seen the British packaging industry grow from a modest side-issue to an important part of the nation's industrial life. From an occasional luxury, the packaged article has risen to the status of an essential feature of civilisation. In some measure, "Pack" hopes to reflect in its pages the constant, romantic growth of the company and the industry which it serves.

Research on Fish Preservation and Processing

The Pacific Fisheries Experimental Station—pioneers in the use of antibiotic preservatives

By H. L. A. Tarr, M.S.A., Ph.D.

(*Acting Director*)

Recent developments in the preservation of food with Aureomycin add interest to this article describing the Pacific Fisheries Experimental Station, Vancouver, British Columbia, where experiments on fish preservation with antibiotics began in 1943. Recently work at the station has indicated that small amounts of Aureomycin in ice will keep fish fresh twice as long as ordinary refrigeration. These and other investigations on fish products at the station are outlined.

THIS station is one of six operated by the Fisheries Research Board of Canada whose headquarters are in Ottawa. The work is devoted to problems which arise in the handling of fish *post mortem*, and includes not only fundamental and applied research but also a certain amount of purely advisory or consulting work with the fishing industry. The disciplines of chemistry, biochemistry, microbiology and engineering are involved. In the earlier years of operation much of the station's work dealt with materials which had no immediate outlet in food products, such as fish oils for pharmaceutical use, fish meals and other so-called by-products. In more recent years there has been a gradual increase in the amount of work carried out on fish products intended for direct consumption as human foods.

The station commenced operation in a small waterfront building in the northerly city of Prince Rupert, B.C., in 1926, and continued to operate there until transferred to Vancouver, B.C., in August of 1942. Some of the important general problems which have been carried out on the use of fish products for human food, with particular emphasis on those studied during the past decade, will be outlined.

Mr. G. Steiner, Mr. J. S. M. Harrison, and Dr. H. L. A. Tarr watching the unloading by brailing of Pacific salmon from a tank on the B.C. Packers vessel *J.R.D.*

Microbiological spoilage problems

Studies on the microbiological deterioration of fish commenced in 1926 with an investigation of the yellow discoloration of the white ventral surface of halibut. The results which were published did much to stimulate interest in the general problem of fresh fish deterioration and its control. Following this work a full-time bacteriologist was appointed to supplement work already being carried out by a refrigeration engineer and a small group of chemists. For the next few years, interesting theoretical and applied studies concerning the microbiology and freezing of fish followed. Original observations were made concerning the types of bacteria causing fish spoilage, their temperature range of growth and their distribution in the sea and on fish. Changes which occurred on freezing fish were investigated with particular emphasis on the effect of freezing and storage of halibut on its palatability, and on rupturing of the muscle cells by ice crystals. The results showed that low storage temperatures were essential if quality was to be maintained. A germicidal ice containing an eutectic concentration of benzoic acid was also developed. Subsequent investigation showed that this ice did not retard growth of spoilage bacteria significantly but that it practically prevented the formation of a substance causing unpleasant odours in fish, namely trimethylamine. Another important problem which was investigated was that of the cracking which occurs when fish are glazed in plain water before being placed in cold storage. It was then common knowledge that fish which were

View of one of the biochemical laboratories. Equipment shown includes (*Left to Right*) a chromatography cabinet, a paper electrophoresis unit, a microtorsion balance, a Photovolt densitometer, a continuous paper electrophoresis cabinet, a Serval S.S.1 high-speed centrifuge and a Beckman model DU spectrophotometer with ultraviolet supply.

"sharp frozen" at low temperatures and were then glazed by dipping in water at about 34°F. in a room at 0°F. assumed a glaze which readily fractured. Cracking of the glaze often resulted in its loss in various regions with resulting unsightly desiccation of the exposed fish surfaces. The effect of adding certain simple chemical compounds to the water used in glazing was investigated and it was found that addition of eutectic concentrations of such substances as disodium phosphate prevented cracking. About 2% of ordinary salt, or of mixtures of inorganic salts, has since been found satisfactory for this purpose, and these are used routinely in the industry, but there is little doubt that the original work carried out at this station had much to do with the adoption of this general procedure.

Frozen fish storage and transport

Another problem which received considerable attention during this period was the so-called "jacketed" or "cold wall" type of cold storage room, which had been developed at the Halifax Station of this Board about 1928. It is only in comparatively recent years that this type of room construction has been used commercially. Due to the almost isothermic conditions which exist between frozen fish and the large areas of the refrigerated walls in such rooms it is not subjected to serious desiccation. Glazed frozen fish stored in such rooms lose little weight.

In Canada iced and frozen fish are often shipped about 3,000 miles by rail and hence the urgent need for improved types of refrigerated railway cars. Considerable effort was expended on the development of an "overhead" bunker-type of refrigerated railway car, in which the construction permitted the attainment of more uniform temperatures in frozen fish transported in them. More recently studies have been carried out with a mechanically refrigerated car.

Fish preservation with antibiotics

Much research effort has been directed toward the problem of retarding microbiological spoilage of fish. The original work on use of sodium nitrite for this purpose was carried out at this station between 1938 and 1940. It was demonstrated that the concentration of this substance which is permitted in cured meats on the American continent (200 parts per million) would strongly delay the normal course of spoilage of chilled fresh fish. Later it was found that this substance also largely prevented formation of trimethylamine. About 1949 the Canadian Pure Foods and Drugs Regulations were so modified as to permit the inclusion of sodium nitrite in fresh fish in concentration not exceeding 200 p.p.m. It was realised, however, that this substance was by no means an ideal preservative and considerable effort was directed toward finding a more satisfactory material. When penicillin was discovered in 1940, it was anticipated that this or some other antibiotic capable of retarding fish spoilage might be found. About 1943 Raistrick's penicillic acid was prepared and investigated for this purpose and was found practically ineffective. This was probably the earliest attempt to use an antibiotic for the preservation of a food. Later other antibiotics were studied, many being found quite valueless. Not until "wide spectrum" antibiotics of the tetracycline group became available and were investigated, was any measure of success achieved. Most striking results were realised with chlortetracycline (Aureomycin) which was found to suppress bacteriological spoilage of fish and ground beef in concentrations of 1 p.p.m. or less. Since this discovery, considerable research concerning the value of this antibiotic in retarding bacterial spoilage of flesh foods has been carried out both at this station and elsewhere. Our own work has involved studies with flake-type and block-type ice containing about 1 p.p.m. of chlortetracycline. In our experience higher concentrations (*e.g.* 2 and 4 p.p.m.) have not proved much more bacteriostatic with the fish we have studied.

To prevent migration of the added antibiotic toward the centre of ice blocks during freezing special techniques have been developed which have involved addition of hydrophillic colloids such as carboxymethylcellulose or carrageen to the water used in mak-

ing the ice. Transient immersion of eviscerated fish in water containing about 50 p.p.m. of chlortetracycline prior to icing them in ordinary ice has also been studied. In our recent work on transportation of fish in refrigerated sea water addition of small concentrations of this antibiotic has been used in some instances. With all these various methods of addition, spectacular results have been obtained, the *post-mortem* storage life of fish being extended from 5 to 10 days in different experiments. Other research has demonstrated that only minute traces, and frequently no antibiotic, can be determined in treated fish by sensitive antibiotic assay methods. Normal cooking procedures have been shown to destroy 85 to 90% of the measurable antibiotic activity in fish treated by these almost trace amounts of chlortetracyline. These results strongly suggest that fish treated by these general methods would not be in any way harmful to human health if cooked in a normal manner. The raw flesh material would undoubtedly contain less than one small average daily oral dose in, say, five tons, and it is extremely doubtful if such small amounts would constitute a health hazard when it is considered that fish is usually cooked before it is eaten.

Refrigerated sea water

It is difficult to say exactly who first used refrigerated sea water as a means of storing and transporting fish. An early French patent suggested the general applicability of this method, but the temperature employed (−4°C.) would freeze fish. The first active experimental work was initiated at the Halifax Station of this Board about 1928 or 1939, where it was shown that *post-mortem* storage of Atlantic cod and haddock in circulating sea water at 30°F. maintained their fresh quality much longer than did storage in ice under usual conditions. Unfortunately, this work attracted little attention, although in a report published from this station in 1947, it was suggested that the application of this method to boats should perhaps be investigated. During the past few years this method has been actively studied here, tank units designed for storing fish in mechanically refrigerated circulating sea water being installed on a few salmon trolling boats, and, more recently, on a fish packing vessel capable of holding some 40,000 lb. of fish. Comparative and other tests have indicated that this method, in many instances at least, offers very distinct advantages over the usual methods of icing. It is expected that the results of a number of our more recent investigations concerning this work will be published in a shortly forthcoming series of Pacific Progress Reports. The storage of both round (non-eviscerated) and eviscerated salmon and other fish in refrigerated sea water has been studied. Probable advantages include the facts that no labour for icing is necessary, the fish retain their natural form better, there is no tendency for crushing and ice pitting, there is no loss in weight, the keeping quality is very greatly enhanced, and unloading of vessels is simplified. A thorough study of important factors such as penetration of sodium ions (salt) protein nitrogen relationships and weight changes is being made.

Part of the instrument room at the station showing a fraction collector, ozonolysis apparatus, Geiger counter and scaler, microcombustion furnace used for carbon and hydrogen determinations, and a refractometer.

Canned salmon

Singly, the most important edible fish product in British Columbia is canned salmon. five species of fish being processed. In general the salmon canning industry is now one which is highly mechanised, and, in fact, practically no outstanding technological advances have been made here in fields other than engineering. Additives other than ordinary salt, are not permitted so that it is difficult to anticipate any revolutionary changes in this industry in the immediate future. However, not enough appears to be known regarding the relationship between the quality of fish canned and the final product. At this station work has been initiated in an attempt to relate *post-mortem* quality of salmon canned to the final product. Colour determinations are being carried out and this has involved considerable work in evolving new colour specifications. Canned salmon frequently contains variable amounts of coagulated protein material which is known to the industry as "curd." It is known that this is formed in unusually large amounts if salmon which have previously been frozen are canned, and it is undoubtedly related to the amount of readily soluble protein which is exuded by the fish. Studies are

now under way in attempts to determine if there is any relationship between variety of fish, location of capture and *post-mortem* age and the amount of curd formed on canning.

Browning of white fish

During work on preparation of precooked dehydrated fish which was conducted at this station about 1943, it was observed that drying was accompanied by appearance of a brown discoloration. Subsequent work with white muscle tissue of certain fish showed that the discolorations caused by heating (*e.g.* 120°C./1 hr.) could be explained adequately on the basis that reactions of the type generally known as Maillard or sugar-protein were involved. More recent studies have shown that the pentose sugar D-ribose is probably the important limiting factor in occasioning browning, and that it is about five times as active as glucose in this respect. This sugar is not present in demonstrable amounts in muscles of living fish, but arises through *post-mortem* degradation of fish muscle nucleic acids. It has been shown that fish muscles often contain an active ribonuclease (depolymerase), a purine riboside phosphorylase and riboside hydrolases. The latter have been shown to play a very important role in occasioning browning, since their addition to fish muscles in which browning does not normally occur will cause hydrolysis of accumulated ribosides with liberation of free ribose and consequent browning after heating. Also, removal of free ribose from fish muscles by enzyme action largely prevents browning. Though other systems involving glucose, glucose phosphate or pentose phosphates may contribute to causing browning in fish muscles, it is probable that they are usually of considerably less significance than the "ribose-protein" mechanism.

In practical attempts to overcome browning by physical removal of the various reactants a new canning procedure has been studied. This involves removal of free liquid and undesirable volatile substances such as ammonia and trimethylamine by a precook and vacuum treatment which is applied prior to canning. Unfortunately this procedure has as yet only been carried out on a small-scale experimental basis.

Installation for refrigerated sea water transportation of fish in the B.C. Packers' vessel *J.R.D.* The three aluminium tanks are shown, one open showing the partition containing the refrigeration coils. The diesel engine and refrigeration compressor are at the right.

Fat oxidation

A problem which has given considerable concern is that of fat oxidation in cold stored fish. In the early days when fish freezing was in its infancy along this coast it was not at all uncommon to see salmon and other frozen fish in which the glaze had evaporated and the exposed fat had become yellow or red in colour. This condition, known technically as "rusting," now occurs rather infrequently, though it is still found in poorly managed cold stores. However, oxidative rancidity does occur, especially with packaged fish in which poor wrapping permits ready access of atmospheric oxygen to exposed surfaces. Well-glazed whole fish stored at low temperatures are not so susceptible to this form of deterioration, though it does occur to some extent.

The obvious methods of retarding rancidity are low storage temperatures, preferably about −30°C., application of ice glazes to whole fish, or use of moisture-vapour proof wrapping materials for fillets. Considerable experimental work has been carried out at this station in attempts to use antioxidants to retard oxidative rancidity in frozen fish. As a result of these, commercial vitamin C (ascorbic acid) has been found to exert some control over rancidity development in fillets of certain Pacific coast fish. This protection is most noticeable with salmon where fading of the red pigments in the frozen material is markedly delayed, and there is often noticeable flavour improvement if the concentration of ascorbic acid is high enough. One company has employed an ascorbic acid dipping procedure for nearly all its packaged fillets, but the application is by no means universal. There is room for further investigation on use of antioxidants, or more particularly with synergistic mixtures of these.

Other investigations

Many fundamental investigations are being actively pursued at this station, certain of which have a direct or indirect bearing on the use of fish as human food. The sodium ion content of fish is being determined, partly in connection with sea-water transportation ex-

periments and partly with the view to obtaining data necessary for manufacture of low-sodium dietetic canned salmon or tuna. An extensive programme concerning the preparation of herring meal has recently been completed. Thorough studies concerning the effect of heating on herring meal were conducted in collaboration with the Poultry Nutrition Department of the University of British Columbia. The results showed that only with very extensive heating was there important loss of nutritive value due to non-availability of essential amino acids. The losses in nutritive value which occurred on mild heating or in normal flame-drying procedures were attributed to destruction of folic acid and certain other vitamins of the "B complex." More recent work in this field has dealt with the effect of the fat in herring meal on its nutritive value. In connection with this general field of nutrition studies have been made on the synthesis of vitamin B_{12} (cobalamins) in herring stickwater by *Streptomyces griseus* and *S. aureofaciens*. The occurrence and types of cobalamins in certain marine invertebrates and seaweeds, and the synthesis of various cobalamins from "Factor B" and purines, benzimidazoles, and related compounds has been studied. An extensive survey of the cobalamin content of fishery materials and of assay methods for the vitamin has also been made.

An investigation on an enzyme method of producing condensed fish solubles is under way. Some of the important findings here are the value of trace amounts of penicillin in inhibiting spoilage of stickwater which must be stored prior to evaporation, and on how this reduces enormously the loss of nitrogen as ammonia which can occur as a result of putrefaction. A study of the "prevention of viscosity" in condensed solubles is also being made. One interesting and rather unusual line of work which has been initiated is that of prevention of *post-mortem* bacterial spoilage of whales by means of an Aureomycin solution which is injected into the mammals in the air stream which is employed for inflation. Initial trials using only about 2 oz. (55 g.) of the antibiotic for whales weighing about 44 tons have been extremely encouraging and it is to be hoped that this line of investigation will be pursued actively next year. A study of the influence of fishery by-products and of various substances which may be responsible for stimulating *in vitro* digestion of cellulose by rumen micro-organisms is also being made.

Fundamental studies in progress include isolation and identification of marine sterols; distribution of soluble phosphorus compounds in fish visceral organs; intensive studies on the vitamin, amino acid, inorganic ion and other requirements of various marine bacteria; studies on certain fish muscle enzymes and other investigations. The total full-time staff of the station is at present 27 with a few university students who work during the summer months.

Light on the Vitamins

(*Concluded from page 234*)

of the practical importance of the vitamins in nutrition. Thus, much that might have been of interest to the specialist, such as methods of chemical synthesis, or the importance of vitamins in bacterial nutrition, is outside the scope of this book, an obvious advantage to those who want only the essentials of the subject without being diverted by what may be interesting but not really germane to the main theme. The book is well printed and bound and contains over 100 illustrations, many of which show cases of vitamin deficiency which happily few of us nowadays are ever likely to see. They are a salutary reminder that the "good old days" were in some ways "bad old days," as Dr. Harris points out. The chemical formulæ are carefully drawn, and much of the data and statistics are set out in the form of tables easily comprehended.

F. A. Robinson.

Fresh Ideas in Packaging

An "ideas" book for the package designer is the description given to the 1956 *Modern Packaging* Encyclopædia by its editors. Emphasis is laid on new ideas in packaging materials and methods, particularly on new uses of cans and glass packages, etc.

This American encyclopædia contains 777 pages and is divided into seven parts: package planning, materials, packages, machinery, merchandising aids, shipping and industrial packaging and the buyers' directory. Properties charts and tables are included as in previous years, and are reinforced by innovations such as statistical tables, tables listing comparative costs of plastic films, papers and foils and a protective packaging properties chart. Another new feature is the indexing of all products advertised in each section on a special page opposite the section's title page.

Food packaging, of course, occupies a large part of most sections and a particularly interesting development reviewed—though all too briefly—is that of food aerosols. Generally speaking the basic principles of aerosol packagings for foods are the same as those for other products, except that there are essential differences in the types of propellent used. Dissolved gases—nitrous oxide, carbon dioxide or a mixture of them—are the most suitable propellents for foods as they are free from objectionable odours and taste and are sufficiently soluble. The editors of this section recognise that cost is one of the main objections to packaging food in pressurised containers—most foods are already cheaper than the aerosol container themselves. However, one of the first popular aerosols in the U.S. was whipped cream, and last year a pressure-dispensed pancake mixture was being sold to American housewives at 39 cents (slightly less than 3s.).

In the directory section it is encouraging to note the names and addresses of no fewer than 48 British firms.

Fish Freezing in Ulster

Smedley's Open Their Eleventh Factory

"A MODEST pilot venture" is how Mr. Wallace V. Smedley described Smedley's new fish freezing factory in Ulster, which was informally visited by the Northern Ireland Minister of Commerce recently.

The factory, which is at Portavogie, Co. Down, was acquired by Smedley's Ltd. in February, and the building is still being converted to cope with all the varieties of fish which will be frozen and packed there. At present cod, whiting, Dublin Bay prawns (scampi) and scallops are being frozen. As they become available, plaice, hake, sole and haddock will also be prepared. It is said that fish are frozen only an hour or two after catches are landed.

Describing the system, Mr. Smedley said: "Our fish is as fresh as it can possibly be. It is not left hanging about for four or five days—which happens when the fish is caught by a fleet at sea for that time. It is landed—and frozen daily."

The new factory—the eleventh Smedley's control in the United Kingdom—has a staff of nearly 50. Most of them are women employed on filleting.

Filleting, weighing and packaging operations at Smedley's new Portavogie factory.

The fish is caught by local offshore fishermen operating in the North Irish Channel, and is transported to the British mainland in insulated containers aboard the firm's own boat, the diesel-engined vessel, *Boy Tomry*. The 4-ton containers are at present being loaded at nearby Donnaghadee because the new Portavogie harbour —opened by the Governor of Northern Ireland last year after nearly £$\frac{1}{4}$ million had been spent on deepening and reconstructing it—has no crane.

At present, the *Boy Tomry* is unloading at Stranraer and the containers driven by lorry to one of Smedley's Scottish or Midlands factories where the fish is stored. Later, however, English ports may be used. Even now, catching, freezing and despatching are so geared that the frozen fish can be in a grocer's cabinet only 36 hrs. after leaving the sea.

As the fishermen return with their day's catches, Smedley lorries wait on the quays to take the fish to the factory. The fish is weighed into 7 st. lots and boxed on the spot and, upon arrival at the works, is stored in chilled rooms at 34°F. to await processing.

First, the catch is transferred to wire-mesh baskets and washed in tanks of water. Then it goes to the filleting tables to be hand-sorted, cut, boned and trimmed. With scampi, the catch is hand-shelled and graded for size.

The bins of fillets are emptied into a further washing tank before the fish is removed for moulding. The moulds are pre-lined with wrappers of transparent film and

(*Turn to page* 248)

Filleting whiting. Cod, prawns and scallops are also treated at the factory.

Confectioners Discuss their Problems at International Meeting

By D. R. Felstead, F.R.I.C.

Automation, sugar supplies and prices, liquorice prices and analytical methods were some of the topics discussed at the fourth general assembly of the International Association of Confectionery Manufacturers which was held recently in Rome. Mr. Felstead, who attended the meeting, has written this account for us.

THE fourth general assembly of the International Association of Confectionery Manufacturers was opened by the Italian Minister of Industry and Commerce at the Palazzo dei Congressi in Rome on April 19.

Col. A. B. Walters received a great welcome on being installed as the second President of the Association in succession to Mons. Jean Herbet. He paid tribute to the work of Monsieur Herbet during his term of office and to the major role played by him in the formation of the International Association. It had been decided to elect Monsieur Herbet to the office of Foundation President.

Mr. J. F. Overwater was elected to succeed Mr. H. Cornet as hon. treasurer and Mr. Cornet was elected vice-president. Col. Walters said that he did not propose to retain the presidency for more than two years and that accordingly Mr. Cornet would assume that office at the next assembly in Brussels in 1958.

Air conditioning

The opening paper, "Air Conditioning in Candy Manufacture," was presented by Mons. L. W. Mertens. After enumerating the various methods by which air may be conditioned he discussed its applications in the confectionery industry, such as in packing, storage, transit and cooling areas. Its benefits included:

(1) Maintenance of an even quality of product at any time of the year with a minimum of scrap and maximum work and machinery efficiency.

(2) Storage of the product, without any risk, for selling at the best time in the best conditions.

In discussion attention was drawn to the very high cost of installation of air conditioning plant and to the fact that in many cases it was needed only for limited periods. A mobile, inexpensive air conditioning plant was needed.

Two papers by Mr. Erzo Seragnoli (G.D. Limited) and Mr. A. Bandieri (Carle and Montanani) followed, in which new Italian confectionery making machines were described.

Automation

Mr. B. Lund Yates, of Baker Perkins (Exports) Ltd., in his paper "Money, Machines and Men," forecast automation in the confectionery industry and pointed to the great need for training technicians capable of staffing the highly mechanised factories which might be a reality within ten years. The only full-time course of the necessary standard was that provided by the Borough Polytechnic in London. An International Education Committee was needed to study the problems of the qualifications needed by students recruited by the industry, training and financial aid for students and colleges.

Dr. A. Casolari (Cafferel Prochet, Turin) announced that a training course similar to that described by Mr. Lund Yates was operating in Turin, and Mr. T. Headen (Jas. Pascall, London) suggested that the technical requirements of the industry were best met by University trained specialists.

Sugar

Mons. A. Viton, chief of the sugar and beverages section of the economics division of F.A.O., surveyed "Trends in World Sugar Economy" in a paper packed with facts and figures. He said that estimates for future consumption were good and assuming the continuation of current trends in income, consumption throughout the world was likely to grow by 2·5 to 3·0% per annum. In other words, the consumption of sugar outside the U.S.S.R., China and the Eastern European countries is likely to increase in the next ten years from 31·5 million tons (raw value) in 1955 to 40 to 42 million tons, these figures showing the continuing rise from the years immediately prior to World War 2 when for the same areas 20 million tons were consumed.

There followed a paper on Essential Oils by Mr. H. Van Mameren (Polak and Schwarz) and one by Dr. Valentine Crea reporting on almonds and hazelnuts supplies.

Liquorice

The second and final day of the assembly was opened by Mr. I. Kreitmann who presented a paper on "The Evolution of Block Juice Prices."

The cost of cultivated liquorice roots was proving higher than that of the natural growths. The total annual requirements were remaining steady at between 30,000 and 35,000 tons of dried roots, and for the last 20 years the prices had tended to rise steadily, the average price for the 1950-55 period being more than double the average price for the 1930-40 period.

These prices had closely followed the agricultural wages of the producing areas, and the author anticipated continuing slow but steady increases. Areas previously

only producing the poorest Mediterranean crops were now being developed for the production of richer crops such as cotton, rice and sugar and new industries were being introduced into the areas and competing for the available labour.

Sorbitol

Mons. F. Jongen followed with a paper on sorbitol and presented a summary of the chemical, physical and physiological characteristics of this interesting hexahydric alcohol. He described its manufacture and use in diabetic preparations and referred to investigations into its hygroscopic nature and its ability to stabilise certain confectionery products in respect of loss of moisture.

In discussion Mr. C. Hinton and Dr. A. Fincke suggested that the paper strengthened the view that there was no evidence that when sorbitol was used in confectionery it contributed properties which could not be obtained by means of invert sugar, although the possibility was not excluded that other properties might be found which would have beneficial effects in soft confectionery.

Dr. A. Fincke (Germany) in his thesis, "The use of food product antioxidants and regulations thereof," discussed the natural and synthetic compounds which delay the degradation of fats by oxidation processes, and summarised the regulations governing the addition of the synthetic antioxidants to foodstuffs in the Western European countries and the U.S.A.

Mr. C. L. Hinton presented a report on the work of the Technical Committee of the International Association of which he is chairman. He reported on the large measure of agreement reached on many such analytical methods and explained that when existing international bodies, *e.g.*, the International Dairy Federation, the International Office of Cocoa and Chocolate and the British Standards Institution, officially or tentatively adopted standard methods for particular materials, the Technical Committee had agreed to recommend them, at least for the time being.

A programme had been prepared of studies of methods that might prove suitable as official methods of the International Association of Confectionery Manufacturers.

The development of automation in the confectionery industry would inevitably lead to a demand for increased standardisation of materials. This in turn posed the necessity for standardised methods of testing materials to comply with specifications and for this purpose the collection of methods which was being prepared by this committee would be a valuable aid.

Mons. Jean Vialla, the Director of the International Association, followed with a paper "The Comparison of Taxation on Confectionery in various Countries."

Five resolutions

The Assembly concluded its business with the framing of its final resolutions. The five of most general interest were:

Sugar. The Assembly has heard with the greatest interest the report on sugar presented by Dr. Albert Viton of F.A.O. This shows clearly the advantages of providing the consumer with sugar at as low a price as possible. The Assembly hopes that F.A.O. will continue its study of this vital subject and will continue to disseminate information about it.

Nuts. The Assembly recalls the resolution adopted at its last meeting in 1954 with regard to the invoicing of edible nuts. As it is now meeting in the main almond-producing country, the Assembly takes the opportunity of again urging that sellers should in future accept an obligation to sell nuts on a net-weight basis and no longer gross for net.

Taxation. The Assembly asks the Director to continue his investigations enabling the taxes imposed on confectionery in various countries to be compared. National associations should provide the necessary information.

Technical Committee. The General Assembly congratulates the Technical Committee on the volume and quality of the work which it has so far done. It encourages the Technical Committee to proceed with its work on the standardisation of methods of analysis and asks the Council to arrange for the publication at the appropriate time of a comprehensive document incorporating the results of this work.

Food Additives. Having considered various reports on food additives in confectionery, the Assembly is made increasingly aware of the difficulties arising from different legislation in various countries which often prevents the use of the same additives in food intended for sale in more than one country. The Assembly notes that this problem is already being actively discussed by inter-governmental organisations and asks the Council to consider whether the International Association can help to secure further international co-operation in this field.

The Dutch Biscuit and Pastry Industry

DUTCH manufacturers of biscuits, pastries, cakes and wafers are classified under 18 headings in the current year book of the Dutch Pastry, Rusk, Biscuit, Cake and Wafer Industry.* The book consists, as in previous years, of a list of Dutch manufacturers of these products, each entry giving the name, address and telephone number of the company, the name of the director, and a code indication of the products made. A key to the code is published in six languages including English.

* *Jahrboek der Nederlandse Banket-, Beschuit, Biscuit-, Koek- en Wafelindustrie.* 1955. Marnixstraat 380, Amsterdam. Pp. 100. Available free.

Paste flavours for the food industry are described in a new booklet from W. J. Bush and Son Ltd. There are certain processes and products, they say, in which the flavour can best be incorporated in paste form, *e.g.* in the preparation of cream fillings for biscuits, when there are certain advantages to be gained in using a flavour based on fat which can be incorporated into the cream with the minimum of mixing to achieve complete and even dispersion. Paste coffee, hazelnut, praline, fruit, liquorice and vanilla flavours are described.

Advances in Food Technology

SAUSAGES

U.V. Inspection

Detection of incipient decomposition in dry sausages can be facilitated by the use of filtered ultraviolet light, since the presence of porphyrins, a sure indication of incipient decomposition, is shown by a typical red luminescence which, so far as is at present known, is not caused by any other substance.—F. Schönberg, *Die Fleischwirtschaft*, 1956, **8**, 185.

FISH

Russian Smoking Oven

A fish smoking oven, described in the Russian periodical *Rybnoe Khoziastvo* (Moscow), has the following dimensions; length, 3·16 m. (10·3 ft.); breadth, 2·5 m. (8·2 ft.); height, 7·05 m. (23 ft.). The oven is so constructed that the upper chamber, in which the fish to be smoked are kept, forms the ground floor while the lower chamber containing the heat source and smoke producer forms the basement. The two chambers are separated by a wire mesh screen. In the upper chamber, two trolleys run on a rail carrying fish on spits in three rows, the capacity being 500 kg. (1,100 lb.) of cod. There are two smoke recirculating ducts on either side connecting the two chambers. The heating is indirect and is made by wood, coal or peat. The plate is warmed by the flames and the hot gases after exchanging the heat, flow under the flue and out through the chimney. The heat is controlled by a sliding damper at the chimney. The smoke producer is of iron, lined with firebricks, and consists of a perforated iron plate 15 cm. (6 in.) from the bottom, on which sawdust is kept. A large amount of smoke is produced with very little air. The smoke passes through a tube into the smoking chamber where the fish are kept, then through an outlet and to a fan. There is a regulating valve which controls the exit of smoke. Part of the smoke is recirculated by a fan into the recirculation ducts through a valve and into the smoke recirculation pipes. The air intake is from the louvres and is controlled by valves. The production capacity of the oven is 61 kg./hr./m^2 (12½ lb./hr./sq. ft.) as compared with 40 kg./hr./m^2 (8·2 lb./hr./sq. ft.) for the Leningrad and Riga type ovens. The oven is used for drying as well as cold and hot smoking of sardines.—*FAO World Fisheries Abstracts*, 1956, Jan./Feb., 37.

FRUIT JUICE

Lyophilisation Process

Lyophilisation is a satisfactory means of dehydrating delicate products such as biological extracts, fruit juices, coffee, etc., without impairing their chemical, physical and organoleptic properties. So far, however, it has been too expensive to be used on a commercial scale, mainly because freezing and vacuum application are essentially intermittent rather than continuous processes. Attempts to commercialise the process have been made in America and Italy. Research carried out in France over the past three or four years, first with a carbonic acid snow apparatus and later with a type of apparatus used at blood transfusion centres, has shown encouraging results, and it seems likely that a continuous process, on a semi-industrial scale, can be developed for the production of fruit juice powders of good keeping quality which, on being mixed with water, regain their original freshness and other properties practically unimpaired.—P. Dupaigne, *Fruits*, 1956, **11**, 25.

CONFECTIONERY

New Enrober

A new multiple-purpose enrobing machine for coated sweets, known as DOVO, has been developed by a French specialist firm (Savy, Jean-Jean). The two substances, for coating and centres respectively, are fed into the two separate compartments of a double-jacketed, hot-water heated hopper. At the bottom of the hopper, a pump of special design, with 18 sets of double pistons communicating with the two hopper compartments feeds accurately adjustable quantities of each of the two substances into a ring nozzle, fitting into moulds formed by a starch-filled box. By pre-set regulation of the flow of enrobing substances during the piston stroke, it is possible to mass-produce enrobed goods of any desired sizes of bottom, centre, top and coating. By removing the special pump, the machine can also be used as an ordinary casting machine.—*Revue Technique de l'Industrie Alimentaire*, 1956, **3**, (3), 40.

MEAT

Effect of Irradiation on Fats

Studies on chemical changes in meats during irradiation were directed to meat fats. Off-odours produced during irradiation of certain meats at sterilisation levels do not arise directly from chemical changes in the meat fats. Oxidative changes (peroxide, carbonyl and free fatty acid formation) are not marked during irradiation or subsequent storage, if the presence of oxygen is minimised. Accelerated peroxide formation occurs during storage of irradiated fats as compared to non-irradiated controls when oxygen-permeable packages are used. —M. Sribney, U. J. Jewis and B. S. Schweigert, *Ag. and Food Chem.*, 1955, **3**, 11, 958.

SOYA PRODUCTS

Uses in Meat Products

Gelsoy, a bland-tasting water-soluble proteinaceous product isolated from soya bean meal, shows promise as a water-binding material in prepared, comminuted meat products, such as frankfurters, meat loaf and canned meat. Sodium hexametaphosphate increases the water and fat binding capacity of *Gelsoy*. A spray-dried mix consisting of *Gelsoy*, non-fat dry milk solids, sugars, vegetable oil, vegetable gum and modified starch, when reconstituted with water is frozen directly without further homogenisation to provide a low-fat frozen confection of good quality and flavour.—E. F. Glabe *et al.*, *Food Tech.*, 1956 **10**, 1, 51.

COFFEE

Determination of Organic Acids

The organic acids of aqueous coffee extracts were determined by partition chromatography. The series of five coffee extracts analysed contained acetic, pyruvic, caffeic, chlorogenic, oxalic, malic, citric and tartaric acids. The predominant acid present is chlorogenic and the one present in low concentration is acetic acid. Traces of formic acid were found in the first coffee extract.—A. F. Mabrouk and F. E. Deatherage. *Food Tech.*, 1956, **10**, 4, 194.

BREAD

Semimicro Test Baking

Experimental error was reduced to a minimum in a method for test baking, primarily designed for the evaluation of additives, by the use of mechanical equipment (part of the Brabender Farinograph and Extensograph) for all dough-handling operations so that operator variability was reduced as much as possible. In order that bread storage tests could be carried out in addition to the usual assessment of fresh loaf characteristics, three loaves were made from a bulk dough prepared with 250 g. flour. Additives were incorporated in the dough by dissolving water-soluble additives in part of the dough water and adding water-emulsifiable materials as emulsions to the dough. Shortenings and materials of a fatty nature were added after 1¼ min. of mixing. Oil-soluble materials were dissolved in liquid paraffin and added after mixing or, when de-fatted flour was used, were incorporated by dissolving in ether and adding the resultant solution.

The results indicated that the described technique was as capable of precision and replication as the standard 16-oz. process and had the advantage of using less material.—M. A. Cookson and Margaret L. Ritchie. *Cereal Chemistry*, 1956, **33**, 2, 102.

EGG ALBUMEN

Pasteurisation Trials

In view of the recent interest in "dry pasteurisation" of dried egg albumen suspected to contain *Salmonella* infection, a recent paper by Banwart and Ayres, of the Iowa Agricultural Experiment Station, is worth notice.

Fresh egg albumen was given a heavy artificial infection with three species of *Salmonella*, and then dried to give a powder of 6 to 8% moisture content. Samples were further adjusted to give a range of moisture contents from 1·5 to 12%. The effect of storage at 50, 60 and 70°C. was then determined, both as regards death of bacteria and quality of the albumen. The rate of destruction of bacteria was found to be greater in spray-dried than in pan-dried albumen. As the moisture rose from 3 to 12%, there was a steady increase in the death rate of *Salmonella*, but storage at 12% caused some loss in quality, even after 3 days at 50°C. With storage at 50°, counts of *Salmonella* were reduced below 0·18 per g. in 9 days at 3% moisture, and in 6 days at 6%.

The main points of interest are (1) that complete sterilisation was not claimed, only reduction to less than 18 *Salmonella* per 100 g., and (2) that even a short storage at 12% moisture content led to deterioration in quality—G. J. Banwart and J. C. Ayres, *Food Tech.*, 1956, **10**, (2), 68-73.

CHESTNUTS

New Cleaning Method

A new method of cleaning chestnuts, devised by Shenk and Vago of the Sericultural Research Centre at Alès, France, consists in exposing the nuts for about 2 hr. to moderate heat (about 55°C.) in a moist atmosphere. This destroys worms and protects the nuts against mildew for about two months. This method does not affect the taste and aroma of the chestnuts.—*La Revue de la Conserve*, 1956, **11**, (3), 102.

Fish Freezing in Ulster

(*Concluded from page 244*)

are the same size as the cartons in which the fish is packed. The fish is eased into the moulds, removed with its "under pack" already in place, and taken to the cartoning tables. (In the production bay, packing and filleting lines are placed in parallel positions, thus facilitating swift and easy transference from one production stage to the next.)

On the cartoning tables, each pack is weighed (scampi in 6 oz. consumer and 1 lb. catering packs; other fillets in 8 oz. and 14 oz. sizes) before being cartoned ready for freezing.

The freezing bay is at present equipped with Jackstone frosters. The cartons are packed on trays which are inserted between freezing plates incorporating evaporator coils through which the refrigerant (Freon 12) is drawn. The top plate is adjustable for clamping by an electrically operated hydraulic jack.

The temperature of the fish is brought down to −5°F., after which the cartons are removed, cased and stored in a cold room to await shipment.

A new company, Ulster Fresh Fish, has been formed to operate the factory. The directors are Mr. Wallace Smedley, Mr. Edward Pratt (chief of Smedley's frozen food production and sales) and Mr. Hubert Cully. The capital is £25,000.

Machinery and Equipment

CAN BODYMAKER

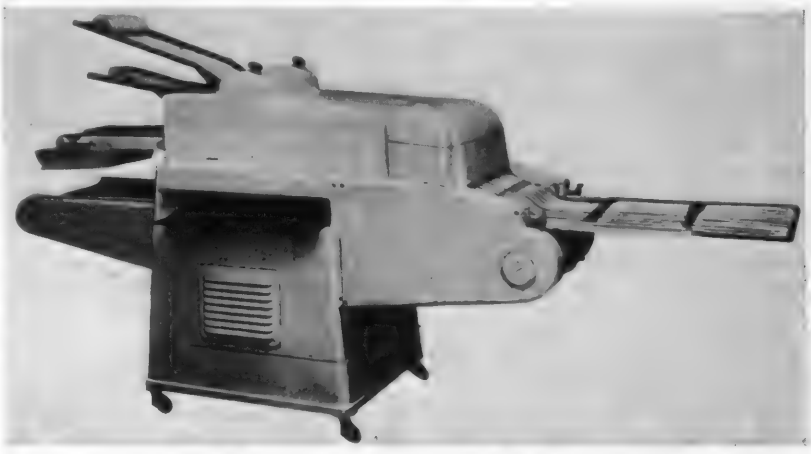
A new, ultra high-speed bodymaker, designed to produce 400 to 450 cans per min. has been developed by E. W. Bliss Company in the U.S. and is to be produced in this country by the company's British associates. Known as the 403, the most significant development in the new machine's design is its compactness. The work table is equipped with knurling, notching, edging and pre-fluxing attachments, yet it has no idle station. A new single-station double action edger is driven by a short eccentric which contributes to the speed. The forming horn is stationary, which permits perfect alignment with the solder attachment. A cam-actuated overhead blank lock prevents movement in the forming station and assures a well-rounded can. Notching chips are removed by compressed air to prevent their jamming the carbide dies or getting into machinery. The bodymaker is furnished complete with automatic controls, limit switches and Bliss control panel.

Built for sustained, automatic operation at high speeds, the bodymaker handles cans ranging from 2⅜ in. to 5⅛ in. in height and from 2 1/16 in to 4¼ in. in diameter. Adjustments in changing can sizes are easily and quickly made.

Other features include the use of short-stroke short-length cranks and eccentrics for smooth operation at high speed; a simplified design so that essential parts likely to require adjustment are readily accessible; and a rugged cast Meehanite base and frame.

The solder attachment with the 403 is a three-station, water-cooled, outside horse type, with an overhead can carrier chain which is provided with guards and driven by its own motor. Because of this construction it is longer wearing and easier to adust.

Solder attachment drive is by a take-off on the main motor. However, it has an emergency motor to provide power for clearing can bodies from the horse if the bodymaker stops.



Italian machine for the automatic manufacture of longuets. Several sizes are available, the largest with an output of 140 lb. per hr. (*See p. 250.*)

The Bliss ultra high-speed can bodymaker producing 400-450 cans per min.

CONTROL VALVE

A pneumatically operated control valve with a positive, leakproof, metallic, bellows seal built in below the conventional stuffing box has been added by Foxboro Yoxall Ltd. to their range of *Stabilflo* control valves. The normal stuffing box is retained and becomes an emergency safety seal. The valve is designed for use on those processes involving liquids which cannot be allowed to escape (even in the minute amounts that might pass the conventional packing gland) because of the danger or loss involved. The valve also meets the requirements of processes under vacuum where no leakage is permissible because of vacuum loss or process contamination from the atmosphere.

The bellows seal is housed in an adaptor spool assembled between the body and the bonnet of a Foxboro *Stabilflo* valve. A close clearance sleeve surrounds the valve stem, the upper end of the sleeve being locked to the valve stem by a specially designed ferrule and locknut. The lower end of the sleeve is seam welded to a bellows and the upper end of the bellows is seam welded to a flange clamped between the gasketed bonnet and adaptor spool flanges. A positive seal against the line fluid is thus provided while the bellows expands and contracts with the reciprocating action of the valve stem.

It is claimed that the bellows has exceptionally long life and continues to function perfectly after continuous difficult service, including both throttling and open and shut control valve applications. The bellows is pro-

tected from possible stroke overrange damage by being designed to handle the maximum stroke of the valve with a wide safety margin.

The valve may also be used as a conventional control valve. The bellows seal is easily removed leaving the stuffing box to act as a seal in the usual manner.

PRE-COAT FILTERS

Mark-O-Print Ltd. have been appointed the sole distributors of the *Rapid* numbering unit. This handy compact and light stamp is claimed to be a great improvement on the heavy existing machines. Clear prints of 3 to 7 digits in sizes from 1 in. to 2¼ in. can be obtained quickly on boxes, sacks, panels, etc. Mark-O-Print quote delivery of approximately 3 weeks and prices from £13.

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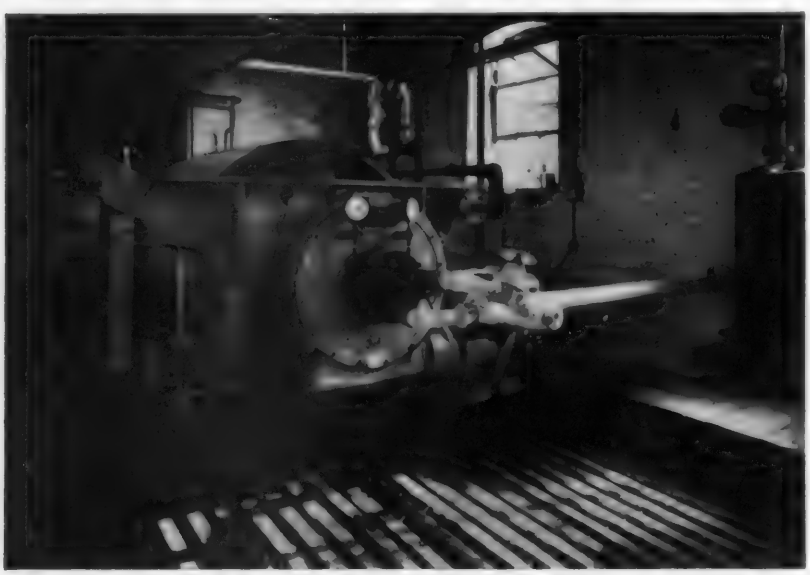
Previously the liquor was treated in plate and frame filter presses, which, although slow, was the only process that would deal with the yeast extract liquor which is an intermediate in the manufacture of Marmite. The purpose of filtering is to remove colloidal solids present in very low concentration in order to give a star-bright liquor. Several other types of filter, including a centrifuge, were tried but failed to deal with the problem.

The *Eimco* installation comprises two identical filters each 4-in. dia. × 4-in. face giving a total of 50 sq. ft. of filtering area per machine. The filters are constructed in mild steel which is *Lithcote* covered in all places which can normally come in contact with the liquor. The internal piping of the drum is stainless steel. The filters are covered with staple nylon fabric P.7522, supplied by British Ropes Ltd. John-Manville Ltd.'s *Celite* 512 is the precoat material. No filter aid is added to the feed slurry.

After initial teething troubles this installation is working smoothly, efficiently and simply, and the plant has exceeded its design capacity by roughly 50%. The plant layout was a joint undertaking by Marmite Ltd. and Eimco (Great Britain) Ltd. and the control panel was constructed by Marmite Ltd.



Pre-coat filter for use in the manufacture of "Marmite"; it has a total of 50 sq. ft. of filtering area.

Rotor chopper for meat, designed primarily for the sausage manufacturer but capable of handling fruit and vegetables as well.

ROTOR CHOPPER

The Foodtech Saxonia rotor chopper for sausage manufacture is designed for operation by unskilled labour. It requires no physical effort on the part of the operator, and eliminates the element of human error in the mix.

The meat circulates in a large, shallow insulated bowl—the size and capacity of which prevents compression and heating—and a cool and even temperature is maintained.

A large rounded dome—an improvement on the customary narrow knife guard—covers the six double-edged rotor knives which give 24 cuts per revolution.

The rotor operates at two speeds, enabling it to perform the independent functions of both chopper and mincer, for which normally two separate machines are required. The lower gear is designed for breaking down of large pieces of meat, *e.g.* legs of pork, back fat and frozen meat. The higher gear ensures an even mix.

The machine can also be used for mashing potatoes, dicing vegetables and cutting fruit. It is streamlined in design, easy to clean, and allows for the removal of the knives for sharpening. It is available in sizes from 40 lb. to 4 cwt.

Additional attachments include:

(*a*) A built-in thermometer to check bowl temperature.

(*b*) An automatic ejector which allows the operator to concentrate on filling.

(*c*) A revolution counter—this can be pre-set at the desired number of revolutions, when the machine will stop.

(*d*) An attachment to crush ice to fine powder. Ice is sometimes used in place of water in the admixture of the rusk. This helps to maintain the fresh appearance of the sausage during warm weather.

NUMBERING MACHINE

LONGUET MACHINE

The growth in the consumption of *longuets* or *gristicks* presented a problem to Italian bakers. These products replace bread, are non-fattening and are encouraged because of their highly digestible dextrine.

Labour was the great problem as the making of these "sticks" demands considerable skill. The problem is believed to have been solved by Rinaldo Rossi Co., who have developed a machine that can turn out any size *longuet*.

The machines are constructed in several sizes and are all fully automatic and electrically operated. The largest has an output of about 140 lb. per hr.

The sticks are shaped between adjustable calendering rollers and can be cut to any length. A system is also provided whereby rusks are directly arranged on the baking pans. The rollers can be adjusted to produce sticks of from 4 to 22 in. long and from ½ to 1¼ in. in diameter. All moving parts are on ball bearings.

The dough is placed on a sliding feeder, passes through the rollers and emerge shaped on pans ready for baking.

News Digest

Automation—Topic at Machinery Makers' Luncheon

"If you keep on advertising, advertising will keep you." The speaker was Mr. Leonard Moody (Wm. Brierley, Collier and Hartley Ltd.) chairman of the Food Machinery Association, at the association's annual luncheon held in London on May 15. He was proposing the health of the guests and his reference to advertising prefaced a welcome to the editors of the technical press who were present at the luncheon.

Mr. Moody found an appropriate reference or quotation to introduce all the association's guests, among whom were Sir Norman Kipping, director-general of the Federation of British Industries, Mr. F. J. Lawton, director of the Food Manufacturers' Federation, Mr. James Morris, chairman of the Institute of Packaging, Mr. Frank West, president of the National Association of Soft Drinks Manufacturers, Mr. T. Whittaker, director of the British Refrigeration Association, and many others.

Discussing the problems of his members, Mr. Moody said that the steel shortage was "like toothache." The prices of coal, gas, electricity, transport and steel were rising and these added costs could not be offset by higher productivity. Nor could the association open export markets which were closed by Government policies. Nevertheless, they had raised the value of food machinery exports from £11 million in 1954 to £15½ million in 1955. This was complementary to the export achievements of the food industry—£134 million in 1954 and £147 million in 1955.

Automation—During his speech, Mr. Moody referred to automatic continuous processing which, he said, was a means of improving not only productivity but safety also.

Automation was also mentioned by Sir Norman Kipping in his reply He said that most firms wanted to expand. The only way they could do this in a population that was static was by automation, thereby relieving the labour shortage. He gave these definitions:

Mechanisation—Repetitive muscle power replaced by machines.

Automation—Repetitive brain power replaced by machines.

FISH OR FISH PRODUCTS?

Bottled, processed salmon are "fish products, frozen or preserved" and not "fish," ruled Mr. Justice Harman in the Chancery Division recently. He had been asked by Wilts Quality Products (London) Ltd., to decide that jars of salmon processed in brine in a Dutch factory came within the former category so that the company could import them into Britain. The Commissioners of Customs and Excise contended that the contents of the jars were "fish," the import of which was prohibited under the Import, Export and Customs Powers (Defence) Act, 1939.

For the company it was said that the product was made from salmon imported into Holland, where it was cut up and mixed, soaked in brine, and then put into jars and sterilised. The Customs and Excise, however, contended that as the salmon was caught in Canada the importation of the products was unlicensed. Counsel for the defendant contended that the characteristics and taste of the original salmon were altered in the processing. "If you ground this fish into a paste and added salt it would be 'fish paste,'" he argued.

Giving judgment, Mr. Justice Harman said that anybody looking at a jar of the fish would naturally conclude that it might properly be described as a product. The Customs and Excise, however, said that for the fish to be a "product" it must be so interfered with or "messed about" as to be unrecognisable when compared with its original state. They contended that it did not come within the general licence issued by the Board of Trade.

"This method of controlling the trade seems to me pre-eminently a restrictive practice," said Mr. Justice Harman. "You forbid everything and then you license a few things and therefore, *prima facie*, it being a restrictive practice, it is for those who wish to justify it to show clearly that the restriction is authorised."

He thought the jars of fish quite clearly came within the category "fish products, preserved." The Customs and Excise must pay costs.

Technical bookshop

All books reviewed in FOOD MANUFACTURE and other scientific or technical book may be obtained from:

The Technical Bookshop,
308, Euston Road,
London, N.W.1.
Telephone: Euston 5911.

Prompt attention will be given to all orders.

Tea monopoly enquiry

The chairman of the Monopolies and Restrictive Practices Commission has appointed the following group to consider and report on the Commission's reference concerning the supply of tea:

Sir David Cairns, Sir Thomas Barnes, Mr. J. A. Birch, Mr. W. L. Heywood, Mr. I. C. Hill, Prof. Sir Arnold Plant and Sir Richard Yeabsley.

The reference was made to the Commission by the Board of Trade on September 7, and evidence is now being taken from producers, blenders, dealers and others interested in the trade. Any enquiries, and any offers to give evidence to the Commission, should be addressed to the Commission at 8, Cornwall Terrace, Regents Park, London, N.W.1.

Anti-waste campaign

A summons was served on the entire directorate, staff and employees—totalling over 2,000—of the Sheffield factory of Batchelors Peas, Ltd., recently. It was delivered by a policeman and the allegation was waste.

The "summons" was part of a scheme of Lt.-Col. Maurice W. Batchelor—a J.P., incidentally!—to introduce a fortnight's new-style exhibition in the factory illustrating how small wastages increase to large proportions in big-scale production. The policeman was, of course, "imitation," and Col. Batchelor included himself in the charge.

Two of the examples given in the exhibition were: "Two or three labels wasted from every 100 means a wastage of several millions—as much as many printers can supply in a whole month."

"A wastage of only 10 cans per line per day costs over the year the same as a pair of nylons for nearly 2,000 girls."

ERECTIONS AND EXTENSIONS

Kraft Foods Products, Ltd., are opening a new distribution depot at New Addington Industrial Estate, Croydon, Surrey.

*

Bournemouth Ice Cream Co., Ltd., are planning the erection of an ice cream factory on a site at the rear of 61-75, Palmerston Road, Boscombe, Bournemouth, Hants.

*

J. Smylie and Sons, Ltd., have had plans approved for the construction of a bacon curing factory at Wigan Road, Euxton, Chorley, Lancs.

*

Cornish Products (Looe), Ltd., have had plans approved for the early erection of a slaughter house and bacon curing factory at West Looe, Cornwall.

*

M. Firkin, Ltd., pork pie manufacturers, are planning the erection of a factory and offices on a site at Blake Lane, West Bromwich.

*

Smedley's Ltd., canners and quick freezers, are to carry out improvements at their Kingsway Works, Dundee, at a cost of £35,000. The improvements are scheduled to be completed before the start of the canning season. One of the items planned is a £15,000 storage loft with a capacity of 30 million cans.

Additional high-speed machines will mechanise the fruit and pea lines.

*

Oxo, Ltd., propose building extensions to their factory at Waterford Mills, Chippenham, Wilts.

*

Thomsons, mineral water manufacturers, are planning the erection of a new factory on a site bounded by The Strand, Albert Street and Shore Street, Barrow-in-Furness.

*

Foster Clark, Ltd., food manufacturers, have plans in hand for the construction of a double-storey extension to their factory in Hart Street, Maidstone, Kent.

*

C. Squires and Sons, Ltd., glass bottle manufacturers, are planning to build a factory on a site at Wyndham Road, London, S.E.5.

*

G. W. Green, Ltd., are seeking permission to build a bakery and ancillary buildings on a site off Water Road, Reading, Berkshire.

Wall's in nine reigns

A Royal Warrant, granted by Queen Victoria in 1838, was a feature of an illustrated display forming the centrepiece of an exhibition to tell the story of T. Wall and Sons, Ltd.,—a story extending over nine reigns from the time of George III.

On view at Unilever House, Blackfriars, the exhibition told how the business began in 1786 when sausages were first made in London's West End. Richard Wall was first apprenticed to a family pork butchery in St. James's Market and inherited the business in 1807. In the display was an artist's impression of the shop in Jermyn Street to which Wall moved in 1834. This shop is still operated by the Wall's organisation which has now six factories.

The exhibition showed that ice cream was first made in 1922, at first only as a means of employing staff during the summer months when the demand for sausages was low. Soon, however, tricycles which bore the famous slogan "Stop-Me-and-Buy-One" were much in evidence. In 1939, they totalled 8,500.

The exhibition graphically illustrated the present day manufacture of ice cream and meat products from the time the various ingredients reach the factories from all parts of the world, to their distribution to shops in all parts of the country.

New sausage additive

A new additive to prevent discoloration of sausages has been announced by Foodtech Ltd. Known as M.S.B., it is soluble and dissolves in the natural juices and penetrates into the pores of the meat. It is said to open the pores, thus tenderising the meat, and by virtue of its consistency sealing them, retaining the natural juices and protein value within the meat. The natural juices—contained and sealed in the meat—do not therefore come into contact with the water.

It is claimed that this additive emulsifies the fat and seasoning and, by so doing, ensures that the mixture is thoroughly and evenly distributed with the lean, bringing out the full flavour of the seasoning. This even distribution of ingredients and emulsion of the fat guarantees that a cooked sausage will be the same size and shape as the uncooked purchase.

As M.S.B. contains no glutinous properties it is possible to produce a sausage containing an equal proportion of fat and lean. It is instantly soluble and does not take the usual 4 hr. to sink in—as does a glutinous additive.

Shipping sausage skins

The Oppenheimer Casing Co. (U.K.) Ltd., announce that a new service has been put into operation, enabling shipments of North American sausage casings to be sent direct to Manchester. This means that only one handling of the casings will be necessary before their arrival in this country.

This has been made possible by a new service which has been launched by Manchester Liners Ltd., operating between the U.S.A. and Canadian Great Lakes ports to Manchester direct.

Wanted: waste food

Bulk quantities of waste, damaged or surplus food materials from manufacturers are being collected for cash by Mr. L. E. Evans, a leading pig producer. Mr. Evans has a fleet of 25 lorries and is well equipped to make regular collections from food manufacturers, preferably in London and the surrounding counties.

At the concentrator plant, Factory Lane, Croydon, Mr. Evans, processes hundreds of tons weekly of what he calls *Featherbed* pig food from bakery and industrial by-products, meat, blood, offal, kitchen waste, barley, maize and other cereals. It is mixed, pulverised and pressure-cooked. The final product, regularly tested and conforming to Ministry standards, is said to be completely sterile, perfectly balanced with a high content of animal protein, and in a form most suitable for feeding.

Mr. Evans claims his pig food (in moist cake form) is at least 30% better value than any other compound pig food on the market.

"Darvyl" for U.K.

Brown and Forth Ltd., who are sole distributors in the U.K. and Eire for the organic chemicals department and the textile fibres department of E. I. du Pont de Nemours and Co., have been appointed distributors for the products manufactured by the electrochemicals department. These include *Darvyl* L-lysine monohydrochloride, the amino acid which is used for the protein enrichment of flour and bread in order to correct the principal defect in the amino acid proportions of wheat gluten.

PEOPLE

MR. S. R. HOWES, director and general manager of Samuel Fox and Co. Ltd., of Stockbridge, is to retire on June 30. He will remain on the board.

Mr. Howes will be succeeded by MR. H. P. FORDER, at present director and deputy general manager of the branch.

■

MR. COLIN BEEVER has been appointed acting Regional Fisheries Officer for the Food and Agriculture Organisation in Asia and the Far East. Mr. Beever, who is 37, was formerly District Inspector of Fisheries at Grimsby. In 1952 he joined the headquarters staff of FAO as a fisheries economist.

■

MR. D. R. MACKIE has been appointed managing director of Monsanto Chemicals Ltd. Mr. Mackie, who has been acting managing director since November, 1955, was appointed a director of the company in 1952 and commercial director in 1953. In May of this year he completed 32 years' service with the company.

■

DR. J. H. PARTRIDGE was unanimously elected president of the Society of Glass Technology at their annual meeting in Sheffield recently. He succeeds SIR GRAHAM CUNNINGHAM, who retired after serving for two years. Dr. Partridge joined the research laboratories of the General Electric Co. Ltd., in 1928 and is today the head of the company's glass, refractories and ceramics department.

■

MR. W. J. J. WEBB has been appointed sales manager of British Visqueen Ltd. He will work at Stevenage. Mr. Webb, who was formerly employed in the London sales organisation of I.C.I., has been responsible for the sale and development of polythene film since it was first marketed in this country by I.C.I. after the war. When I.C.I. joined forces with the Visking Corporation, Chicago, in 1953 and introduced *Visqueen* as an improved form of polythene film into this country, Mr. Webb was transferred to the newly formed subsidiary company, British Visqueen Ltd. Mr. Webb is a member of the Southern Area Committee of the Institute of Packaging.

■

MR. H. G. FAULKNER has been appointed general works manager for the new £2½ million food factory being built at Ashford, Kent, for Batchelors Peas Ltd. Mr. Faulkner, who is 43, began his career in the canning industry, later moving to an appointment with a large biscuit company. He was appointed general manager of the Talent Group of companies in 1948 and later took up work as a management consultant. Until the new factory is completed, Mr. Faulkner will be working from Batchelors Peas (Southall) Ltd.

Mr. H. G. Faulkner

■

At his own request, and following his recent illness, MR. G. W. MUDDIMAN has resigned as chairman of Birds Eye Foods Ltd., and as a director of Smethursts (Grimsby) Ltd. He will take up a special appointment in Birds Eye (Holdings) Ltd., of which he is a director, and will be available to help the Unilever quick freezing interests in the U.K., Australia and New Zealand.

MR. J. R. PARRATT, marketing director, has been appointed chairman of Birds Eye Foods Ltd. He first joined Unilever in 1934. In 1951 he was appointed sales director of Hudson and Knight Ltd., and was subsequently plans director of that company. He joined Birds Eye Foods Ltd. as marketing director in 1953.

■

MR. J. H. RADFORD, who has been secretary of H.P. Sauce Ltd., for many years and a director for the past eight years, has been appointed assistant managing director. MR. C. DIXON has been appointed secretary.

■

MR. A. C. C. BAXTER, MR. A. F. H. BLAAUW, MR. F. J. PEDLER and DR. E. G. WOODROOFE have been appointed members of the Board of Unilever Ltd.

Mr. Baxter is a member of the board of the United Africa Co., with whom he has been since 1937. He is in charge of the merchandise side of the business. Mr. Blaauw, who studied chemistry at Delft Technical College, has been technical director of the Unilever interests in Germany since 1947. He has managed factories in the Netherlands and in India, and has been a member of the European Group Management at Rotterdam. Mr. Pedler, after service with the Colonial Department, joined the United Africa Co., in 1947 and became a member of its board in 1950. He is the author of two books on West Africa. Dr. Woodroofe has been head of Unilever Research Division since April 1955 and is responsible for the co-ordination of the work in research establishments in Europe and the U.S.A. During the four previous years he was the technical member of the Unilever Oil Mills Group Management.

Obituary

MR. S. E. A. NICHOLSON, food executive of W. J. Bush and Co. Ltd., died at his home on May 3, after a brief illness.

For more than 40 years, Mr. Nicholson had devoted to the company and to the food industry within the United Kingdom and Overseas, the most loyal, untiring and distinguished service. His loss will be grievously felt by the countless friends associated with him in his work.

His activities were varied. In particular he will be remembered for his work with the National Bakery Students' Society, of which he was President for the year 1953/4. He had a keen interest in music and was an accomplished pianist and organist, and was a Licentiate of the Trinity College of Music, London. During the past 13 years Mr. Nicholson was organist and choirmaster of the North Chingford Congregational Church, and in the previous 12 years had been organist at the Clapton Park Tabernacle. Indeed, his interest in all church matters was profound.

He leaves a widow, to whom sincerest sympathy is extended.

■

MR. FRANK TRAVERS, chairman of Joseph Travers and Sons Ltd., died suddenly on April 4.

Born in 1892, he joined the company in 1919. After service with the overseas department, he was appointed to the board of directors in 1923, becoming deputy chairman in 1927 and chairman in 1943. He also held office in the London Chamber of Commerce, as treasurer, later as vice-chairman, and was its chairman of council at the time of his death.

■

MR. ERNEST BROOK, founder of Brook Motors Ltd., died at his home in Huddersfield on April 16. He was 82 and had been in failing health for some time.

Born in Pontefract in 1873, he was educated at the Leeds School of Science and Art and the Yorkshire College. He started to make alternating current electric motors on his own account in 1904, in a single room in Threadneedle Street, Huddersfield, with two assistants. Brooks Motors now employs 2,700 people and has an annual turnover of £5 million.

Gamma ray preservation of food

THE FIRST aim of the new D.S.I.R. sterilisation research group will be to survey the possibilities of treating common foods with all the various possible types of ionising radiation. Most attention is being given initially to the treatment of poultry, meat and fish products, but studies on other foodstuffs such as potatoes (for prevention of sprouting) are being carried out on a smaller scale.

The group was formed in late 1955 at the Low Temperature Research Station, D.S.I.R., to carry out an extended programme of research into the uses of ionising radiations for preserving foods. High voltage electron generators and gamma ray sources in several other laboratories are being made available for this work and are already in use. The work will be greatly increased in scope by use of two X-ray generators which have just been installed in an annexe to the food laboratory itself. These are of high output (90 kV, 75 mA) and will be employed mainly for explanatory studies. Smaller scale work has been carried on at the station for several years and has shown that many important problems remain to be solved in spite of promising results. Interest in the subject is increasing and the new programme has been planned to provide further basic information.

The group working on irradiation of foods is led by Dr. R. S. Hannan and now totals six scientific workers. The Metal Box Co. Ltd. and the British Food Manufacturing Industries Research Association have seconded members of their staff to work with Dr. Hannan. Metropolitan Vickers Electrical Co. Ltd., has made a Research Fellowship available. This is held by Dr. Margaret J. Thornley, who is in charge of the microbiological aspects of the work. Dr. B. Coleby, Brookbank Fellow of the University of Cambridge, is initiating radiation chemical studies, particularly in the relatively unexplored field of irradiation of fats.

Caution.—Work on the application of the ionising radiations specifically to foods is still in an early experimental stage and great caution is advised in speculating on the future of the method. There is no doubt that food can be sterilised by treatment with large doses of radiation and that irradiation could be carried out on a commercial scale. In this respect British electron generators which have been available commercially for some years are among the most advanced in the world, while large radioactive sources will become available within a few years as a by-product of the operation of the Nuclear Power Programme. Difficulties arise, however, in the form of adverse effects on food quality. These are often marked at the radiation dose levels needed for sterilisation and most promise of avoiding them is seen in the use of relatively low doses. Sufficient micro-organisms can be inactivated in this way to increase the storage life of foods at refrigerator temperatures. Insects or small animals in the food can be eliminated and potatoes can be prevented from sprouting during storage. Reliable predictions of the potentialities of such processes can only be made when more facts are available and proper comparison has been made with alternative procedures.

Educating the public in nutrition

A suggestion that representatives of food manufacturers and the larger food shops should join with health visitors, dieticians, welfare workers, school teachers and others in improving the education in nutrition of the general public was made at the food and nutrition section of the 63rd Health Congress of the Royal Society of Health at Blackpool recently.

Talking about the education of the school child and the adult in nutrition, Miss Elizabeth Walton, of the Northern Counties College of Domestic Science, said that the housewife was in all probability the keystone in the maintenance and improvement of the nutritional status of the nation.

" Indeed much of the work of eminent scientists and medical men would be in vain should she fail to apply in practice the results of their investigations," said Miss Walton. She suggested that each area should form a society of enthusiastic people, including health visitors and other responsible officials, to work together and help improve the education of the general public.

In the same section Miss Joan Robins, principal home service adviser to the North Thames Gas Board, referred to the new Food and Drugs Act controlling the right of food manufacturers to make claims for the nutritional value of their products.

" What it is impossible to control in law is the over-emphasis of a valid claim or the high-lighting of a particular property of a food product which gives an unbalanced picture of normal nutritional requirements," said Miss Robins.

" This is a serious gap in our educational defences which might be overcome by more co-operation from advertisers and from the newspapers accepting these advertisements."

She said there were a few firms which had made nutritional education part of their selling policy but these were firms usually associated with the production of pharmaceutical products and not with basic or supplementary foods.

Confectionery and bakery courses

Details of forthcoming courses in confectionery and bakery have been announced by the Borough Polytechnic.

Information on full-time courses leading to the Diploma and Higher Diploma in Chocolate and Sugar Confectionery is given in a pamphlet available from the Polytechnic. The usual part-time courses (one day a week) leading to the City and Guilds Intermediate and Final certificates will begin in the week Monday, September 26, and applications should be made after September 1.

The Higher National Bakery Diploma can be taken in two ways; as a two-year course for those who already have their National diploma or as a three- or four-year course for students coming direct from school.

Details and registration forms for these courses are available on application to the Department of Chemistry and Food Technology, Borough Polytechnic, London, S.E.1.

Manufacture of confectioners' glucose

A talk on " the manufacture of confectioners' glucose " was given by Mr. A. P. Buchanan, a director of the Albion Sugar Co. Ltd., at a meeting of the Bakers' Prepared Materials Research Panel of the British Food Manufacturing Industries Research Association.

The chairman of the panel is Mr. J. Valentine Backes, of Burton, Son and Sanders, Ltd.

The manufacture of liquid glucose was based on the breakdown of starch under conditions of acidity, temperature and pressure, said Mr. Buchanan. It was possible to vary the composition of the product by adjusting the conditions and length of the conversion period.

The water white glucose widely used in the confectionery and allied industries was usually prepared from maize or potato starch by hydrolysis for 10 min. in an autoclave, the product consisting in the main of a mixture of dextrin, maltose and dextrose.

After the dilute glucose had been discharged from the autoclave and neutralised, it was filtered and collected. The crude glucose liquor was purified by three successive treatments with activated carbon under controlled *p*H conditions in order to remove the flocculated impurities consisting of oil, protein and fibre.

The liquid was filtered after each treatment and the concentration of the clear liquor was carried out in two stages.

The purity of the glucose depended on the efficiency of the refining process, but an important factor was the purity of the starch. The starch manufactured in Britain was mainly from

imported maize which, after steeping, was subjected to a "wet milling" process.

The efficient running of a starch plant was directed towards the maximum recovery of solids, both starch and by-products, and the finished starch should not contain more than 0·3% of protein. Modern developments included the use of centrifuges for purifying and a continuous conversion system for producing glucose of consistently high quality.

"Sandwich" course for dairymen

The "sandwich" dairy technical education course proposed by the Joint Committee for Technical Education in the Dairy Industry, has been approved in principle by the Ministry of Education and the Ministry of Agriculture, Fisheries and Food. Full approval is expected after the provision of further information to the Ministries, and the course should then commence in October.

It was originally proposed that a three year "sandwich course" for the training of dairy foremen, under managers and other floor workers, should be provided at the Cheshire School of Agriculture; six months of each year to be spent at the school and the remaining period back on the job. However, the Ministry of Education indicated that the course was too long, and a modified scheme has been suggested for a course of two periods of six months at the School with intervening periods of like duration in creamery employment.

Rank's new flour mills

Joseph Rank Ltd.'s £2 million Caledonia Flour Mills at Leith have been officially opened by the Lord Provost of Edinburgh. After eight years of construction (caused by repeated delays in steel supplies) the plant went into use last November.

The plant is a most modern unit, with deep water quay berthage at which grain ships tie up, to feed grain into a tunnel conveyor, running into the 40 ft. deep basement to be elevated to the 100 ft. silo. Flour can be shipped direct and at the rear road, rail and sea distribution is available to ensure fast efficient handling of the output.

Speaking at the luncheon Mr. Rank said that the present silo had a capacity of 10,000 tons and that a second similar unit was being built. The ship elevators were capable of handling 240 tons of grain per hr.

Melon flavour

A new flavour—melon—has been introduced by Söflor Ltd., for use in fondants, chocolate centres, ice-cream, jellies, desserts such as mousse and table creams and other food products.

Cider fermentation—controlled or uncontrolled?

COMPARISONS of cider made by controlled and uncontrolled fermentation were made by visitors to Long Ashton Research Station's annual cider sampling day last month. A recurrent problem in vintage trials is the variation between one fermentation and another. The yeasts and bacteria in each juice are different and variations in the type of fermentation often obscure the real difference in juice quality. Samples of four varieties—two bittersweets, a bittersharp and a sweet—were made by a standardised method involving the use of sulphited juices and yeast addition and by the older uncontrolled fermentation method. The ciders were all centrifuged and filtered at a specific gravity of 1·005, sweetened to s.g. 1·020, saturated with carbon dioxide and pasteurised in bottle. Visitors were invited to taste the samples and state their preferences. The majority preferred the samples in which fermentation had been controlled, except in the case of the bittersharp (Kingston Black).

The cider crop was well below average in 1955 and, in conjunction with the hot summer weather, this gave juices of high sugar content. The average specific gravity of juices pressed at Long Ashton last year was over 1·050, whereas for the last five years the average has been 1·047. Some small-scale pressings of selected fruit varieties gave s.g.'s of over 1·070 and these ciders were among those sampled in the first group—single variety ciders made from well known vintage varieties and from varieties with good orchard characters selected for vintage test. One in particular, White Norman—a bittersweet with a s.g. of 1·086 and a tannin content of 5%—was voted outstanding by several of those present at the sampling.

Ciders sampled in the third group were taken from a series of tests made to determine how far sugar content contributes to vintage quality. Two of the ciders had the same alcohol content but contained different proportions of juice, while the third was higher in alcohol but had the normal juice content. Visitors showed a marked preference for the cider with the higher alcohol content.

The morning programme ended with a series of ciders drawn from the current stocks, made from the bulk pressings of fruit in 1955, sweetened, carbonated and filtered. During the afternoon, visitors were shown round the laboratories and plantations. Exhibits in the cider house included a display, showing the determination of alcohol in ciders, and single variety perries were available for tasting.

Grain handling film

Mechanical handling methods in the grain industry are the feature of "The Seed is Sown," a 26-min. colour documentary film sponsored by the Mechanical Handling Engineers' Association. Intended to serve as a supplement to the documentary films "Mechanical Handling" and "Conveyors as Your Servants" produced in 1948 and 1952 respectively, the film differs from its predecessors in that it shows the appplication of mechanical handling to one specific industry.

The earlier shots show the type of machinery employed in the ploughing and preparation of the soil ready for the reception of the seed. These are followed by a sequence illustrating modern methods used in the preparation and processing of the seeds and showing how mechanical handling helps in the grading of the seeds and the segregation of extraneous matter.

The scene then moves to the production of fertiliser and the film shows the intake of raw materials, mixing, processing and sacking of the finished fertiliser. Next comes the simultaneous drilling of the ground and the deposit of insecticide, seed and fertiliser followed by harvesting and the subsequent delivery to the flour mills.

Attention is then turned to the many and various methods of dealing with imported grain at the large ports in Britain where are installed pneumatic and other forms of handling plant for the expeditious reception and distribution of the grain, thus ensuring a quick turn-round of the large ocean-going vessels. This sequence includes a floating pneumatic handling plant which can be towed alongside any ship in the dock area, thus overcoming the difficulty arising from the concurrent arrival of more ships than can be accommodated by the mill berths.

The scene is then transferred to the reception and storage of the grain at the large port mills and at the medium and smaller inland mills, followed by a sequence dealing with the processing of the grain and the ultimate despatch of the flour.

The final section deals with the end products such as biscuits, a breakfast food and bread.

The film may be borrowed from the Association.

French plastics for U.K.

Whiffen and Sons, Ltd., have been appointed sole agents in the U.K. and the British Commonwealth, for the sale of the superpolyamide plastics manufactured by S.A. Organico of Paris, and sold in France under the name of *Rilsan*.

COMPANY PROFITS AND PROSPECTS

More profits for Molasses

United Molasses Co. Ltd., is paying a final Ordinary dividend of 11¾% net, making 16¾% tax free for 1955. This compares with 12¼% net for 1954.

Total group profits have risen from £4,322,696 to £5,170,654.

*

Cerebos' still pay 30%

The group profit of Cerebos Ltd., last year rose from £639,100 to £746,443 after an appreciably lower taxation charge at £796,707 (£897,179). The Ordinary dividend remains at 30%.

Products of the Cerebos group include *Bisto*, Scotts porage oats and a number of other food commodities as well as table salt; there is also an industrial demand for salt.

*

Sauce profits higher

Group profits of H.P. Sauce Ltd. in 1955 rose to £1,294,280 as compared to £987,775 in the previous year. The net profit is £598,550 compared with £427,221. The final Ordinary dividend remains unchanged at 20% and the total dividend is the same at 25%.

*

Chocolate profits fall

An excessively hot summer and a fall in the price of cocoa beans affected the profits of the chocolate industry last year, reported the chairman of Joseph Terry and Sons Ltd., at the company's annual meeting. The hot summer affected sales during the latter half of the second quarter, and the third quarter of the year. The fall in the price of cocoa beans—due principally to smaller demand in the U.S.A. where the manufacture of chocolate has undergone some change—necessitated large writing down of stocks at the end of the year, which considerably reduced the profits.

The net profit before taxation is £274,791. Deductions leave a balance of £149,190 compared with £269,608 for 1954. A final dividend of 10% was made, making 15% for the year.

*

£1·5 million from glass bottles

A year of unprecedented demand in the whole glass container industry was met by an all-time record production, announced Mr. L. A. Elgood, chairman of United Glass Bottle Manufacturers Ltd., at their annual meeting. The outstanding summer during 1955 benefited the soft drinks and brewing industries particularly and the only event which marred the company's trading during the year was the need to raise bottle prices again.

The group trading profit for the year is £1,414,312 compared to £865,640 in 1954. An interim Ordinary dividend of 3¾% was paid during the year and a final dividend of 7½% was made.

Included in the group trading profit is nine months profit of the Alloa Glass Co. Ltd., which U.G.B. acquired during the year. The alternative would have been the building and equipping of a completely new plant in Scotland.

*

Lime juice factory extensions

The best summer for years lifted sales of Rose's lime juice to a record level, announced the chairman of L. Rose and Co. Ltd., at their annual meeting. The net profit for 1955 is £112,212 as compared with £64,102 in 1954. A final Ordinary dividend of 17½% was made, making with the interim dividend of 5%, a total of 22½%.

The expanding sales have made it necessary to undertake a major extension to the company's premises at St. Albans to provide additional working and storage facilities. The alterations which will cost about £100,000 should tend to keep down unit costs by centralising several operations.

Glossary for valves

Two new parts have now been published to B.S. 2591, Part 1: 1955, applying to screw-down stop, check and gate valves, which was published to meet the need for consistency in the terminology used to describe valves and their parts:

Part 2 defines types of, and parts for, the following type of valve:

Ordinary safety valve, direct spring, direct weight, lever and weight, and lever and spring loaded, ordinary safety valve, "Ramsbotton" type and relief valve. There are seven illustrations of typical safety valves.

Part 3 defines types of, and parts for, the following types of plug valve and cock:

Lubricated plug valve, non-lubricated plug valve (including lift plug and split plug types), plug cock, gland cock, compound gland cock, and packed cock. There are six illustrations of typical plug valves and cocks.

Copies of these publications may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1, at 6s. each.

Unilever millions for new food plants

CAPITAL projects amounting to £41 million—an increase on the previous year of some £8 million—were approved during 1955 by Unilever Ltd. and Unilever NV. They include Batchelor's canning factory at Ashford (£2,244,000), the extension of processing and distribution equipment for frozen foods in England (£1,652,000), an oil hardening plant for margarine at Purfleet (£780,000), the modernisation and extension of Wall's meat products factory in London (£461,000), the provision of tea-bagging machines for the U.S.A. (£369,000), the extension of ice-cream plant at Hamburg (£264,000) and plant for the manufacture of speciality fats at Silvertown (£160,000).

Turnover of the Unilever companies rose from £1,437,429,000 in 1954 to £1,514,987,000 in 1955 and trading profits rose to £85,455,000 compared with £70,095,000 in 1954.

1,589,000 tons of margarine, edible fats and salad oils, to the value of £250,494,000 were sold, representing 17% of the total turnover. Other foods for human consumption, vegetables and animal oils and fats and animal feeding-stuffs were sold to the value of £651,527,000 or 43% of the total turnover.

Margarine. One of the chief developments during the year was a large increase in the German sales of the high quality margarine *Rama*. This has replaced *Sanella*, Unilever's standard brand in Germany as the world's largest selling brand of margarine. The margarine trade was also good in the U.K., in which 1955 was the first full year since 1939 free from Government control, and in the Netherlands where a change in the turnover tax and the final elimination of the levy on margarine enabled prices to be reduced. Margarine sales improved in the U.S.A. in spite of higher competition from butter manufacturers, but the industry as a whole did not increase its tonnage, and Unilever's share in the market cooking fats declined. A new factory at Boksburg in South Africa was opened and enlargements were made to manufacturing capacity in Turkey. The company regained possession of their margarine and oil factory at Atzgerdorf in the former Russian zone of Austria.

Other Foods. The tea businesses suffered from violent price fluctuations, particularly in Australia and Canada, though Lipton's in the U.S.A. increased their turnover slightly. Batchelors, in the U.K., had a disappointing year with their canned peas and profits were lower for the Mac Fisheries business, though turnover increased. The hot summer enabled Walls to increase their ice cream sales by nearly one third with a more than proportionate increase in profits. Ice cream sales and profits also rose in Germany.

Dried soup sales increased nearly everywhere and sales of canned tuna by Unilever's importing business were also higher. Hartog's meat business held its own in the Netherlands and Walls in this country had a higher turnover, though their profits were less than in 1954. Birds Eye continued to progress and the introduction of their *Fish Fingers* was particularly successful.

Model byelaws for slaughterhouses

The Ministry of Agriculture, Fisheries and Food have issued model byelaws for private and public slaughterhouses under the title "Ministry of Agriculture, Fisheries and Food, Model Byelaws, Series III and IIIa." (H.M.S.O. 6d.)

The models are intended to assist local authorities in making byelaws under sections 68 and 72 of the Food and Drugs Act, 1955, for securing that slaughterhouses are kept in a sanitary condition and are properly managed. Byelaws for this purpose are needed to ensure that adequate standards are maintained during the interim period which must elapse before regulations can be made under section 13 of the Act and become effective for all slaughterhouses.

The Minister is the confirming authority for both public and private slaughterhouse byelaws. When such byelaws have been made by local authorities, persons affected by them will have a month in which to make representations to the Minister, who will take them into account before confirming the byelaws.

Cheese at the Grocers' Exhibition

Traditional English cheeses were prominently displayed at the Grocers' and Allied Trades Exhibition in Manchester last month, on the stand of the English Country Cheese Council. The ten most popular cheeses of England and Wales were displayed and free samples given away to the public. Another feature of the stand was an automatically operated screen on which, by pushing a button, the public was able to see three short colour films advertising English cheeses. Information on the merchandising plans prepared by the Council was also available on the stand.

Bacon and canning industries in N. Ireland

At the Grocers' Exhibition, the Northern Ireland stand demonstrated some of the more important aspects of the farming and food industries in the area. The bacon industry is said to be worth at present almost £22 million a year. Current production is estimated at 50,000 tons (valued at £19 million) and in addition 2,500 tons of lard (£350,000) and 9,000 tons of sausages (£2,500,000) are produced.

An extensive canning industry has grown up in Northern Ireland and was featured at the exhibition. The industry is additionally valuable because home produce constitutes its raw materials. Of 96 million gal. of milk sold off the farms of 24,000 Northern Ireland producers in 1955, 60 million gal. were manufactured into milk products for export. The remaining 36 million gal. were consumed locally.

OBITER DICTA

● Popcorn is gaining favour with young Japanese movie goers. Previously fans had favoured dried octopus.—*Popcorn Merchandiser.*

● Our crabs are very good and your herring is wonderful, particularly if you use it with a bit of vodka.—*Mr. Khruschev at Castle Bromwich B.I.F.*

● No efforts in a factory can turn a bad egg into a good one or put a heart into a lettuce that lacks one.—*Minister of Agriculture, Fisheries and Food.*

● While the hot dog is the favourite food of youngsters, oldsters go for them too. They furnish an easy-to-bite, high-protein food that is easy on artificial dentures. — *American Meat Institute.*

● A man accused here of stealing cold cutlets from a restaurant counter, told the judge he thought "the sticky mess they made under my pullover" should be counted as punishment enough."—*Berlin Correspondent, Reuter.*

● Consultation between Ministers, the Trades Union Congress and the Federation of British Industries can work wonders as we have all seen, but it cannot lay eggs or grow last season's potatoes.—*George Schwartz in the Sunday Times.*

● Customers in restaurants or sandwich bars treating themselves to smoked salmon sandwiches at 2s. 6d. or 3s. per round do not want cat's fish dyed and adulterated with groundnut oil. Equally, those who want fried plaice do not want fried dab.—*Chairman, General Purposes Committee, Middlesex County Council.*

● Under a recent Government order, we are no longer allowed to describe cream buns and doughnuts as such, unless filled with dairy cream. We anticipate a further order with regard to rock cakes (at present they contain no rocks) and it is also conceivable that Chelsea buns, Eccles cakes, Banburys, etc., may have to be imported from their places of origin. And alas, no fairies in fairy cakes.—*Statement circulated at Bakers' N.A. meeting.*

Instrument Society's office

The Society of Instrument Technology Ltd. has taken offices at 20, Queen Anne Street, London, W.1, (telephone, LANgham 4251-2). The Secretary is Commander A. A. W. Pollard, D.S.N., R.N. (Retd.).

New products at Scottish food fair

New food products seen at the Scotland's Food Exhibition in Glasgow recently emphasise the trend to prepacking by food manufacturers. The developments included a completely new idea from Aberdeen—precooked haddock fillets. The Cooked Food Service Ltd. is handling this development which involves crumbling and deep frying of single haddock fillets, wrapping in transparent packs and dispatching within 24 hr. of landing. This firm is also planning to include precooked herring fillets and fish stocks in their range of products when their present commitments permit. They have recently introduced polythene sacks to take 30 retail packs of their *Nibb-Its* in place of tins; this eliminates returns, cuts costs and makes for easier handling all round.

A Midlothian oatcake manufacturer, J. M. and M. Henderson Ltd., has introduced a new refill pack, consisting of a board sleeve around a *Cellophane* 12 oz. pack. The oatcakes are transferred from the sleeve into the empty tin, saving the cost of a container and reducing the price to the consumer. The firm have also introduced a new high quality shortbread range under the name *Petticoat Tails.*

Robert Wilson and Sons (1849) Ltd., showed an unusual form of packing for their *Ulster Fry*, a processed meat product which is said to eliminate all the waste normally found in bacon. The prepared meat is wrapped in 6 lb. packs in *Viskase* and then in stockinette which is wax dipped. This is claimed to provide a completely sealed hygienic pack, capable of long storage and suitable for easy handling; a ripcord on the pack allows the trader to tear away the textile and wax coating and leave the *Ulster Fry* ready for slicing.

The Department of Agriculture for Scotland showed dehydrated produce prepared by Torry Research Station. A ¼ lb. pack of dehydrated cabbage makes up to 12 lb. of reconstituted vegetable, while a ¼ lb. pack of carrots provides 8 lb. of reconstituted. Blackcurrant jam is also being prepared in compressed sections, packed, like the vegetables in polythene. These foods are still at the development stage and are not available commercially; the main advantage of this work would emerge in a period of emergency.

Food News Overseas

U.S.S.R. wants food machinery

British equipment for the food industry to the value of 50-70 million roubles is required by Russia. This was disclosed at the conclusion of the talks between the Prime Minister and Mr. Bulganin and Mr. Khruschev. Cocoa beans and salted herrings are also wanted by the Russians. These goods are not affected by the strategic export controls.

Cadburys' new cocoa plantation

Cadburys' have leased from the South Cameroons Government 1,200 acres at Ikilliwindi, some 15 miles north of Kumba, which is the centre of the territory's developing cocoa industry. The firm has already begun the clearing of the site, which it proposes to develop into a model cocoa plantation, as it wishes to encourage cocoa production in this area.

The lease of this land is in accordance with the Southern Cameroons Government's intention to attract overseas enterprise to the territory.

International Confectionery Fair

Plans are being made for the second International Pastry and Confectionery Trade Fair to take place in Dusseldorf, from May 4-12, 1957. The first fair was held in Dusseldorf in 1953.

British representatives for the fair are John E. Buck and Co. Ltd., of 47, Brewer Street, London, W.1.

W. German fat consumption

Sales and consumption of edible fats and oils in West Germany, which rose steeply in the first few years after the currency reform in 1948, have now reached a normal volume and are expected to increase only slowly in the future, according to Reuter.

Last year's figures showed that the overall increase in the oil and fat consumption almost corresponded to the growth of West Germany's population. Consumption per head of population was nearly unchanged from the previous year.

Sales of oils and fats for direct use in households last year were as follows (in tons, the increase over 1954 in brackets): Margarine 641,203 (27,500), other vegetable fats 51,323 (4,800 tons less than in 1954), edible oils 89,778 (2,800).

A total of 34,842 tons of fats and oils, about 4,500 tons more than in 1954, were sold to the food producing and processing industries.

The pure fat equivalent of all sales last year was 689,000 tons, about 24,500 tons more than in the previous year.

The decline in the sales of other vegetable fats for direct use in households indicates the steadily rising consumption of processed food in West Germany.

Rice mill for Guiana

British Guiana's most modern rice mill, which was built in two years at an overall cost of $2 million at Anna Regina in the County of Essequebo, was officially opened recently. The new mill, which is electrically driven, is capable of processing 3½ tons of rice per hr. It is the second large mill to be erected in British Guiana, the first being at Mahaicony/Abary on the East Coast, Demarara.

Conference on food technology

A series of conferences in modern food technology will be presented by the Massachusetts Institute of Technology in a two-week special summer programme, from June 18 to 29.

Special attention will be devoted to new and unique developments made by the Department of Food Technology in rheological measurements of foods, radiation sterilisation, automation and the food industry, and knowledge of nutrition including geriatrics.

Whale oil yield disappoints

The whale oil output achieved in the Antarctic whaling season, which closed in March, was described as disappointing in an editorial article in the Norwegian newspaper *Sandefjords Blad*.

The main feature has been the very varying results achieved by individual expeditions, writes the newspaper. "This is a clear sign that the stock of whales is declining. Luck is becoming more and more the deciding factor."

Leaders of the Norwegian whaling industry are hoping that foreign whaling companies will now agree to limit effectively the number of catcher boats employed by the expeditions. Such a limitation would reduce operating costs without reducing output. Profits at present, writes *Sandefjords Blad*, bear no reasonable relationship to the heavy investment involved.

Swedish food research publications

Proceedings of a symposium on the nutritive aspects of preserved foods, held in October 1954, and of a symposium on cured and frozen fish technology held in November 1953, have been published and are obtainable from the Swedish Institute for Food, Goteborg 5, Sweden.

The proceedings of the symposium on nutritive aspects of preserved foods contain the papers given (of which two are in German and the rest in English) and a summary of the discussions. The price is 30 Sw. Cr. (about 37s.) including postage. The proceedings of the symposium on fish technology costs Sw. Cr. 25 (about 44s.) including postage.

Nigerian canning plant

In partnership with Liebig's Extract of Meat Co. Ltd. and the Northern Regional Production Development Board, John Holt and Co. (Liverpool) Ltd., the British firm of West African merchants, have established a small cannery near Kano, Northern Nigeria, for the production of canned meat products for sale in Nigeria and elsewhere in West Africa.

In this way it is hoped that a part of the large cattle resources of Northern Nigeria can be converted into a form suitable for consumption in those areas where meat and other protein foods are difficult to obtain or expensive to buy.

The cannery commenced production during 1955 and the volume of sales is so far encouraging.

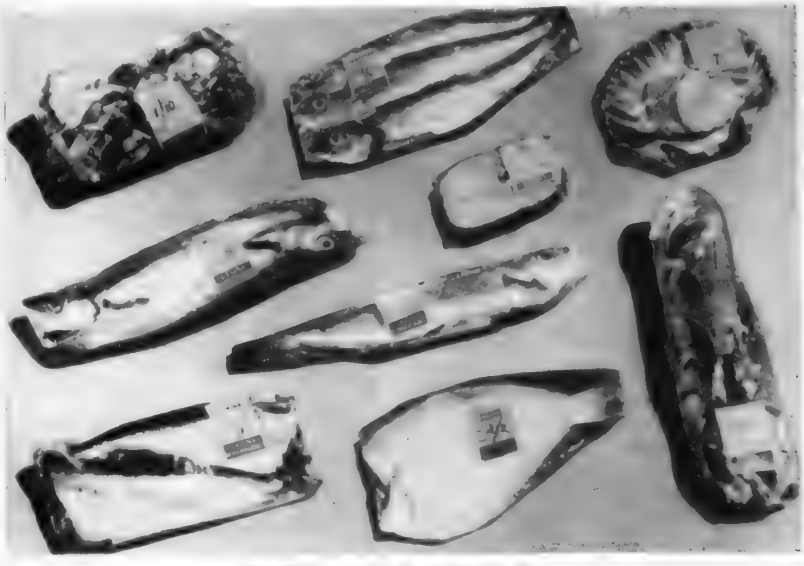
Food at the Ghent Fair

For the first time since it was inaugurated in 1946, the International Fair of Ghent will have more foreign than Belgian exhibitors. The organisers claim that British firms have taken larger orders in Belgium (in proportion to the size of the country) than anywhere else. This is because Belgium's Liberal government, which strongly upholds "Free Trade," has abolished all import licences.

Food manufacturers were among those who took the largest orders at last year's fair, particularly manufacturers of biscuits, chocolate, canned fruit, soups, vegetables, jam, marmalade, whisky and soft drinks.

The Fair will be held from September 8 to 23.

Packaging



Wet fish packed in cellulose film.

Cheaper tapes

John Gosheron and Co. Ltd., have cut the prices of two of their popular self-adhesive tapes—*Transotape* (a self-adhesive cellulose tape) and *Transovil* (a self-adhesive vinyl tape).

Actual price reductions vary a great deal over a wide range of widths in standard lengths and will represent a considerable saving in production costs.

Improved polythene film

A new and improved type of *Visqueen* polythene film has been introduced by British Visqueen Ltd. It is a great deal more transparent, has considerably higher tear strength, and much improved mechanical properties. The improvements result from important changes in production methods made in recent months by British Visqueen Ltd.

Tear strength, possibly the most important mechanical property from the user's point of view, has been increased by some 40% as indicated by the Elmendorf tear test. Other mechanical properties, such as tensile strength and percentage elongation at break, have also been improved in the new film.

The new transparency of the film is expected greatly to widen the scope of this material as a display packaging medium. While the characteristic waxy translucence of polythene film has been greatly reduced in the new product, other important properties of the material remain unchanged. These include its printability and its ability to function satisfactorily on automatic machinery.

These improvements have been introduced without any change in price.

Brighter wrap for butter

An aluminium foil wrap has been designed for Nurdin and Peacock Ltd., the London butter factors, for their sales of *Bubbling Brook* Danish butter. Venesta Ltd., who designed the new pack, say that a change over from a vegetable parchment to a foil wrap presents no major technical problems as the same machinery can handle both materials.

Bubbling Brook wrap consists of a ·009 mm. gauge foil laminated with micro-crystalline wax to D/C 13/14 lb. vegetable parchment, and is supplied in cut sheets, sized 8⅛ in. × 6½ in.

Paper box design contest

The British Paper Box Federation and the British Carton Association are organising a contest to decide the best designed paper boxes. There will be several sections and classifications in the contest, which is based on the lines of the one held in 1954.

Entries for the contest will be required during October and the judging will take place on November 20.

Pre-packaged wet fish

Pre-packaged wet fish has been introduced by Lyons in their supermarket at Cadby Hall. Believed to be the first major store to sell wet fish and shell fish the self-service way, Lyons report high sales and popularity for the new goods.

The fish is prepared on the spot—pre-packaged in moisture-proof *Cellophane* cellulose film and displayed in open-top refrigerator cabinets.

Methods of wrapping vary with different types of fish. Whole fish and fillets are placed on small pieces of cardboard (roes are put on fibre trays) and overwrapped with *Cellophane*. Packs are then closed by heat-sealing the film against the cardboard base. Crabs, scallops or lobster claws are wrapped without a cardboard base, the hard shell being a satisfactory surface on which to seal the film. Pre-packaging is completed by applying thermoplastic price labels with a sealing-iron.

The full pre-packaged range includes every fish normally sold by "orthodox" fishmongers. Smaller items, such as herrings and whitings, are made up into packs containing 2 or 3 fish, whitings intended for consumption by the cat being packaged whole. Cod cutlets, fillets of plaice and other popular cuts of various sizes are also pre-packaged.

Window lamination—a new combination

Film lamination is widely recognised for the particular advantages it imparts to paper and board. The increasing number of laminated record-cases and children's book-covers on the market are two examples of its popularity.

Now Celloglas Ltd. have extended the process to provide a new application—window lamination, using, as before, *Clarifoil*, the Celanese acetate film which is specially made in thin gauges for laminating. This modification means that the film is applied *in one operation* to flat surfaces and cut-out areas, thus giving a high-gloss finish to the preprinted carton *and* a brilliantly clear window. The result is an attractive package, laminated all over for clean handling and enriched colours, and with a crystal-clear window for product appeal. The conventional separate operations of varnishing and windowing are therefore effectively replaced by the combination technique of window lamination. As the film covers the entire surface of the carton there is no risk of it becoming displaced and around-the-corner, die-cut windows can be treated by the same method using *Clarifoil*.

Covers of brochures and other advertising material with peep-through cut-outs, can also be window laminated for added eye-appeal and interest.

New Companies

Triglass Wine Co., Ltd. (561925.) Distillers, merchants of and dealers in wine, spirits, beer, etc. £100. Subs.: S. Shaw and T. G. Woodburn, St. Swithin's House, Walbrook, London, E.C.4.

Hainault Couvertures Ltd. (561353.) 89, Hainault Road, Romford, Essex. Mfrs. of and dealers in chocolate and chocolate couvertures, etc. £2,500. Dirs.: Frances J. and Mrs. M. D. McGinty.

S. Stocks and Sons, Ltd. (561381.) 225, Burnley Road, Accrington, Lancs. Brewers, maltsters, licensed victuallers, etc. £6,000. Dirs.: Allan Stocks and Alfred Dowling.

South African Fruit and Vegetable Canners' Association (Pty.), Ltd. (F.4514.) City Gate House, Finsbury Square, London, E.C.2. £200. Name of person authorised to accept service: J. R. Campbell.

Porkies, Ltd. (561601.) Regent Street, London, W.1. Sausage and pie and potted meat mfrs. and dealers. £100. Subs.: G. H. Davies and P. H. Higgs.

Alb-Foam-O (Sales), Ltd. (561607.) Importers and mfrs. of and dealers in articles of food manufactured or combined in any other preparation. £100. Subs.: J. C. M. Gubbins, 18, Bolton Square, London, W.1, and J. R. Gowlett.

North Eastern Bakeries, Ltd. (562014.) To acquire from United Bakeries, Ltd., all or part of the issued share capitals of the companies set forth in the Schedule of an agreement; to acquire all or part of the share capital debentures or debenture stock of any company carrying on, either in the north or eastern parts of England or elsewhere, the business of bakers, confectioners, pastrycooks, etc. £100. Subs.: Edith Sanders and F. McCarthy, 6, Austin Friars, London, E.C.2.

Harry Ingram, Ltd. (562144.) York Road, West Hartlepool, Co. Durham. Mfrs. of and dealers in boiled sweets, chocolates, biscuits, etc. £7,000. Dirs.: H. and Mary Ingram.

Golden Crumpets (Sheffield), Ltd. (562223.) 193, Baslow Road, Sheffield. £6,000. Dirs.: E. A. Pearce, J. D. Wood and R. J. Hastings.

Trebor Candies, Ltd. (562237.) Mfrs. of and dealers in sweets, chocolates, candies, etc. £100. Subs.: F. L. Gunstone, 30, Woodside Road, Amersham, Bucks, and M. A. Needs.

Trebor Confectioners, Ltd. (562238.) £100. Subs.: F. L. Gunstone, 30, Woodside Road, Amersham, Bucks, and M. A. Needs.

G.C. (Holdings), Ltd. (561738.) 31-45, Gresham Street, London, E.C.2. Contractors, bakers and mfrs. of crumpets, bread, cakes, etc. £100. Subs.: R. J. Hastings and D. Wisdom.

Lenal Wood Products, Ltd. (561788.) Ibex House, Minories, London, E.C.3. Mfrs. of and dealers in wooden manufactured and semi-manufactured articles for use in the catering, confectionery and ice cream trade, etc. £100. Dirs.: L. C. and A. Lourie.

G. Bonwick, Ltd. 561826.) 30, Faircross Parade, Longbridge Road, Barking, Essex. Mfrs. of and dealers in chocolates, sweets, etc. £1,000. Dirs.: G. and Mrs. M. Bonwick.

From Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C.2.

The Leonard Hill Technical Group this month

Dairy Engineering.—Cleansers for Aluminium Dairy Plant; The Preparation of Bulk Starter in a Cheese Factory; New Butter-making Methods in the Soviet Union; Ice Cream Cup Filling Machine Speeds Airline Catering Service in U.S.; the Early Days of Railway Milk Transport, 1.

Chemical and Process Engineering.—Recent Developments in Rubber Lining; Size Reduction; Commissioning a New Chemical Plant; Industrial Uses of Trichlorethylene and Some Codes of Working Practice Involved; The Chemical Engineer and his Inventions; New Laboratories for Monsanto.

Corrosion Technology.—Corrosion Problems of Sulphuric Acid Plant; Corrosion of Packaged Articles; Spread of Protection.

Fibres (Engineering and Chemistry).—An Evaluation of the O.M. Super High Draft Spinning Unit; Wool Oils; Radioactive Isotopes and their Use in the Textile Industry, 2; A Laboratory Test for Pilling.

Paint Manufacture.—Applications of Statistical Methods to Technological Research in the Surface Coatings Industry; Anti-fouling Paints Progress, 2; Instruments for the Paint Industry; Location of the Paint Industry.

Manufacturing Chemist. — Cosmetic Engineering; 1; Manufacture of Lauryl Alcohols; Canadian Chemical Expansion; Radiochemical Laboratory of the U.S. Bureau of Standards; Progress Reports; Perfumery and Essential Oils, Disinfectants and Disinfection, Analytical Chemistry.

World Crops.—Weed Problems in World Agriculture; Economics of Weed Control with Special Reference to MCPA; Weeds: A Limiting Factor in Tropical Agriculture.

Atomics. — Electromagnetic Pumps for Liquid Metals, 2; The Indian Point Project, 2; Halogen-Quenched Geiger-Müller Counters, 1.

Petroleum.—The Production of Epoxides from Petroleum; Calibration of Oil Storage Tanks and Tank Vessels; The Significance of Laboratory Tests in an Oil Refinery; Hydrogen Attack on Refinery Equipment, 1; Recent Trends in Oil Geology.

Trade Marks

APPLICATIONS

MALOBAR.—745,141. Chocolate, chocolates and non-medicated confectionery, all in bar form. **W. and M. Duncan, Ltd.**, 27, Beaverhill Road, Edinburgh.

ATOM AGE.—745,949. Non-medicated confectionery. **T.V. Time Foods, Ltd.**, 1, Tower Chambers, Hoe Street, London, E.17.

OMORA.—744,130. Non-alcoholic drinks and preparations for making such drinks, and fruit juices. **Co-operative Wholesale Society, Ltd.**, 1, Balloon Street, Manchester.

AVAGLUCO.—B744,883. Non-alcoholic beverages containing glucose. **J. H. Ferguson and Sons, Ltd.**, Cambridge Lane West, Plymouth.

MERLOVA.—745,067. Non-alcoholic grape juice. **"Ova" Obstverwertungs G.S. des Bezirkes Alfoltern,** Alfoltern am Albis, Switzerland, c/o Wildbore and Gibbons, 101, Leadenhall Street, London, E.C.3.

SPANISH RHAPSODY.—745,721. Wines. **Beaufoys' Wines, Ltd.**, 16, Villiers Road, Kingston-upon-Thames, Surrey.

LORELEI.—745,916. Wines. **A. J. Koenen, Ltd.**, 14-16, Half Moon Passage, London, E.1.

GULF STREAM.—746,017. Wines, spirits (beverages) and liqueurs. **Stewart and Son of Dundee, Ltd.**, 40 Castle Street, Dundee.

EL MONUMENTO.—746,049. Sherry wine. **Julian and Trower, Ltd.**, 25, Laurence Pountney Lane, London, E.C.4.

BACCHANAL.—746,152. Wines, spirits (beverages) and cocktails. **Osborne and Son, Ltd.**, 84, Golders Green Road, London, N.W.11.

PEACAW.—746,457. Wines (alcoholic), spirits (beverages), liqueurs and cocktails. **Peatling and Cawdron, Ltd.**, 71, High Street, King's Lynn, Norfolk.

ROSELLA.—741,741. Meats, vegetables, fruits and mixtures of meat and vegetables, all being preserved or canned; jellies (for food), crystallised fruits, meat extracts, vegetable extracts, fruit extracts, mincemeat, preserved minced fruit; and preparations of fruit and of vegetables all for spreading on foodstuffs. **Rosella Preserving and Manufacturing Co., Ltd.**, 64, Balmain Street, Richmond, Victoria, Australia.

SILVER FEN.—743,422. Butter. **Modern Butter Packers, Ltd.**, Littleport Street, King's Lynn, Norfolk.

FULAN.—744,145. Canned fish. **Duncan Fox and Co., Ltd.**, 144, Leadenhall Street, London, E.C.3.

ARCTIC WAFER.—B741,737. Wafers (biscuits). **Scribbans-Kemp (Bakeries), Ltd.**, 1000, North Circular Road, London, N.W.2.

VITAMOR.—741,924. Rice, tapioca, sago, flour and cereal preparations, being food for human consumption and for use in making beverages; all for sale in Northern Rhodesia. **Rhodesian Milling and Manufacturing Co. (Private), Ltd.**, Tanganyika House, Salisbury, Southern Rhodesia, c/o Boult, Wade and Tennant, 112, Hatton Garden, London, E.C.1.

ENESTEROL.—747,052. Non-alcoholic drinks and preparations for making such drinks, fruit juices and tomato juice. **Energen Foods Co., Ltd.**, 65, Pound Lane, Willesden, London, N.W.10.

Information and Advice

This Service is available to subscribers to FOOD MANUFACTURE. If a stamped addressed envelope is enclosed replies will be sent by post, but enquiries cannot be answered by telephone.

Fruit purée

B.7754. *What is the correct procedure for obtaining a fine but thick purée from soft fruit (raspberries and blackcurrants). If the steamed pulp is passed through a rotary brush sieving machine, what size screen is recommended and is subsequent screening through a vibrating mesh or homogenisation in a cream homogeniser then recommended?* (Clogheen, Co. Tipperary)

A sieving machine with a 100 mesh gauze lining is used for a blackberry purée, though further filtration through a finer mesh would be necessary for a completely clear product. Further sieving through a vibratory screen should not be necessary, and normally a fruit purée does not need homogenisation.

French mustard

B.7382. *We should like a recipe for French mustard.* (Groningen, Netherlands)

We suggest the following:

White distilled vinegar, 40 "grain"	125 gal.
Japanese yellow seed	87.5 lb.
English yellow seed	62.5 lb.
Turmeric	6 lb.
Cayenne	3 lb.
Salt	41.25 lb.
Cloves (powdered)	2 lb.
Allspice	1 lb.

Before starting to grind a batch the ingredients must be thoroughly mixed. If possible, the mix should be made the day before grinding and allowed to stand overnight in a covered tank, or for at least 5 hr., to liberate the volatile oil and produce a hotter product.

The mixing tank is equipped with paddles or arms attached to a shaft which keep the batch constantly agitated. Two of these paddles are at the bottom of the tank to prevent the material from caking there.

The vinegar is first run into the tank, then the crushed mustard seed may be added. This is followed by the addition of spices and salt.

It is important that the batch should be thoroughly mixed before it is run through the pump.

Sauce for tripe and onions

B.7819. *We are canning tripe and onions and would like to be able to produce a thick sauce using farina and milk or water, which would remain white after processing. We find that considerable browning occurs. This is inhibited by a trace of sodium bisulphite. Occasionally we get a separation in the sauce which looks objectionable. We should be pleased for your comments.* (Dublin)

If milk is used there is bound to be some degree of browning at the temperature necessary to achieve sterilisation.

As regards the separation, we suggest the use of a thickener such as sodium alginate, which is fairly stable to heat in non-acid conditions. It would also be wise to pre-cook the meat and vegetable before fanning in the sauce, as cooking causes shrinkage and expression of some of the juices. The latter would dilute the thick sauce and could help to promote separation.

If the sauce contains any oil or fat it is, of course, necessary to prepare a stable emulsion by the use of an emulsifying unit, otherwise the fat will rise to the top during cooking.

Information supplied

The Enquiry Service has dealt with requests for the names of manufacturers and suppliers of plant, machinery and materials, and also general information as follows:

B.7749. *Advice on making good table salt.* (Adana, Turkey)

B.7750. *Suppliers of cocktail sticks.* (Bridgwater, Somerset)

B.7751. *Suppliers of floor cleaning machines.* (Gateshead)

B.7752. *Information on "snap freezing."* (Rome, Italy)

B.7753. *Information on uses of starches.* (London, E.7)

B.7754. *Advice on making thick purée from fruit.* (Clogheen, Eire)

B.7755. *Manufacturers of plastic protective gloves.* (Cambridge)

B.7756. *Manufacturers of bag clasping machine.* (London, W.2)

B.7757. *Information on making bakers' chocolate couverture.* (Liverpool)

B.7758. *Information on cold storage of egg yolk/salt mixture.* (Dublin)

B.7759. *Information on glucose production.* (Alost, Belgium)

B.7760. *Information on starch.* (Eslöv, Sweden)

B.7761. *Supplier of machines for check weighing filled cans.* (London, N.W.10)

B.7762. *References to bacon curing and processing hams.* (Northampton)

B.7763. *Advice on making crystallised roses.* (Brisbane, Queensland)

B.7764. *Names of vegetable dehydrators.* (Selby, Yorks.)

B.7765. *Manufacturers of fat clarifiers.* (Dublin)

B.7766. *Suppliers of savoury flavours and essences.* (Leicester)

B.7768. *Suppliers of machinery for expressing almond oil.* (Calcutta, India)

B.7769. *Advice on making orange squash.* (Brigg, Lincs.)

B.7772. *Recipe for salmon paste.* (Silsden, Yorks.)

Recent Patents

COMPLETE SPECIFICATIONS ACCEPTED

749,804. International Minerals and Chemical Corp.: Process for treatment of waste liquor from beet sugar molasses.
750,027. J. J. Ciboit: Pasteurising and sterilising apparatus.
749,897. F. Hesser Maschinenfabrik A.G.: Bag-filling and bag-closing machines.
750,055. Svenska Sockerfabriks A.B.: Process of manufacturing hard sugar.
749,965. R. Mazzoni: Machine for tenderising meat.
749,970. G. A. Seewer: Dough sheeting mechanisms.
750,473 and 750,474. Ecko Products Co.: Tin-plate baking pans.
750,217. Nibb-it Products Association S.A.: Process for producing foodstuffs from starch-containing powders.
750,315. Soc. des Etablissements Barbet: Distillation of alcoholic musts.
750,424. Moorhouse Bros., Ltd., and E. Woodhead: Trolleys for the display of articles such as bottles of beverages and the like in crates.
750,349. T. G. Farish: Potatoes.
750,250 and 750,251. Kork-N-Seal, Ltd.: Apparatus for applying closures to bottles.
750,446. A. Askey: Biscuits for holding ice cream.
750,283. Food Machinery and Chemical Corp.: Apparatus for trimming fruit and the like.

ABSTRACTS OF BRITISH PATENTS

Bottle closure

An assembly for closing beverage bottles includes a cork in contact with a carrier member impregnated with a mild antiseptic, preservative, etc.—745,275. *H. Erben, Ltd.*

Dough handling machine

Proofer and pan conveyors operate in timed relationship and are driven by the same driving means, the speed of the latter being variable independently. The same driving means operates pan indexing fingers.—745, 397. *Union Machinery Co.*

Package filling machine

In a machine of the volumetric filling type which forms a number of measured loads, associated check weighing devices receive such loads prior to their discharge into containers, and pneumatic volume varying means are responsive to such weighing devices indicating large or small deviations from a standard weight to vary the volume of a load accordingly.—745,280. *Pneumatic Scale Corp., Ltd.*

Bottle filling machine

A counter-pressure machine incorporates a liquid receiver and a liquid-level control device which is valve-controlled for regulation of the entry of pressure air, etc., to maintain the liquid level at a height corresponding to the required level in the bottles. Filling heads on the receiver are connected with such device and bottles are subjected after filling to the pressure in the device to equalise the liquid level of the bottles to that of the device.—745,008. *Farringdon Works and H. Pontifex and Sons, Ltd.*

Jelly powder

A packeted dry food consisting of a jelly powder, a sweetening agent and a flavour determining material, the latter in the form of solid highly flavoured fondant.—745,384. *Monkhouse and Glasscock, Ltd.*

Dough preparation plant

A motor drives the main shaft of a dough divider and can be coupled to drive a second shaft from which a hander and first prover are driven, a second motor being provided for taking over the driving of the second shaft only, thereby enabling the first motor and the dividers to be stopped for cleaning, etc.—745,311. *Baker Perkins, Ltd.*

Hop cleaning machine

Mixed hops and leaves pass beneath a shroud positioned closely over a wire-mesh, etc., conveyor carrying the mixture, the shroud being connected by ducting to a fan leading to an exhaust, whereby the leaves are drawn directly from the mixture and discharged to waste.—745,260. *E. H. Burr et al.*

Pipe connection for grain conveyer

A flexible and resilient joint member between the respective ends of a rigid tube connecting two spouts for conveying cereals to a plansifter, comprises a section of inverted-U or tubular form, held in place between a spout and an end of such tube to allow articulation and limited relative longitudinal movements.—*Henry Simon, Ltd.*

Chocolate paste machine

Fresh components of a mixture are incorporated continuously into a stirred closed circuit of an already homogenised paste material at a rate not more than one-third of such material (*e.g.* one-sixth). A quantity of the paste material is removed at the same rate as the fresh components are added.—741,412. *S.A. Française pour la Séparation l'Emulsion et le Mélange Procédés S.E.M.*

Vapour-air cooking

In a method of cooking, for example, ham in moulds, hot air as a heat carrier is driven by a fan through a treatment chamber, water vapour is supplied to the heat carrier up to its saturation point, and the mixture of water vapour and air is passed from bottom to top or *vice versa* through the chamber.—742,277. *O. Oehring.*

Food container

The inner surfaces of a container are coated with material comprising a hydroxylated conjugated diolefin polymer (*e.g.* polybutadiene), an ester of such polymer with unsaturated fatty acids containing 12-14 C atoms per mol. (*e.g.* linseed acids), or a mixed ester of the polymer with such acids and polybasic acids.—745,024. *Phillips Petroleum Co.*

British abstracts are published by arrangement with the Technical Information Co., owners of the Patent Abstract Journal.

ABSTRACTS OF FOREIGN PATENTS

Cereal proteins

An agent for increasing the tenacity of cereal proteins contains as active component thrombin or thrombin plus agents which transform prothrombin into thrombin.—*Danish* 79,246.

Preserving fruits

Fruits such as apples and lemons having high pectin and acid contents are preserved without chemical preservatives or air-tight containers. Fruits such as pears having a relatively low pectin and acid content can be preserved in a similar manner if they are mixed with acid and pectin-rich fruits. The fruit (including peel) is sliced and boiled with 15-100% by weight of water until soft and until 20-55% of the water content has been lost. The pulp is pressed through a screen, the *p*H adjusted to 2·7-3·3 with lemon juice or citric acid and 65-100% of sugar by weight of the pulp is added. The mixture is boiled for 4-10 min., poured into flat pans and dried at low heat for 15-60 min. to form a solid cake which can be stored at normal temperatures for long periods without deterioration.—*Canadian* 491,076.

Dough additions

Secondary fermentation in dough containing surface-active agents is prevented by the addition of one or more organic and/or inorganic acids, *e.g.* acetic acid, lactic acid, citric acid or tartaric acid; monocitrates or monotartrates of sodium, potassium, ammonium or calcium; or phosphates or pyrophosphates of calcium, sodium, potassium or ammonium. The growth of proteolytic enzymes is prevented by the addition of oxidising agents, *e.g.* potassium bromate, ammonium persulphate, ammonium borate, or of ascorbic acid.—*Belgian* 526,486. (Through *Chem. Abst.*)

Insecticide for cereals

Bentonite is dehydrated by physical methods, mixed with suitable cations, and added in amounts of 2-5% to cereals. It kills *Silotroga cerealella, Tinea granella, Plodia interpunctella, Oryzæphilus surinamensis, Tenebroides mauritanicus, Sitophilus oryzæ, Rhyzopertha dominica* and *Læmonophlœus ferrugineous* in less than 1 day by dehydration. *Sitophilus granarius* was killed in 7-10 days but its reproduction was inhibited quickly.—*Spanish* 211,622. (Through *Chem. Abst.*)

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MODERN COFFEE PRODUCTION

A. E. Haarer, F.L.S., Dip. Hort., R.H.S.

The aim of this book is to supply the planter, the student and the field extension officer with an informative and interesting treatise in simple language. The author has endeavoured to say nothing that has not proved sound in practice or been based on the results of reliable research.

If the book has a strong East African flavour, it is not alone because the author has had his practical experience there, but because methods of cultivating coffee in East Africa are now of the highest order and are seldom equalled elsewhere. There are numerous line drawings and over a hundred photographs, some of which were taken by the author himself.

Starting with the early history of coffee, Mr. Haarer discusses at length all aspects of coffee production. There is detailed information on cytology, genetics, environment, shade, lining and holing, pruning, care and maintenance, harvesting, diseases, pests, etc., and a chapter devoted to the economic aspects. In addition, production in Africa, Asia and the Antipodes, and the Western Hemisphere is dealt with in greater detail in separate chapters.

The author's experience began at the age of twenty when he was appointed manager of coffee estates in Uganda. He was directly connected with the formation of the Kilimanjaro Native Planters' Association, now the K.N.C.U. In connection with his botanical collecting work for Kew and the British Museum he was elected a Fellow of the Linnean Society in 1928, and later, in 1930, he took charge of an Agricultural Training School. He now contributes to many journals at home and overseas, and has written several books on fibres.

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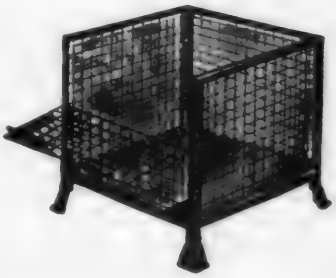

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... refrain from the use of tobacco (including snuff) while he is handling ... food or is in any food room in which there is open ...

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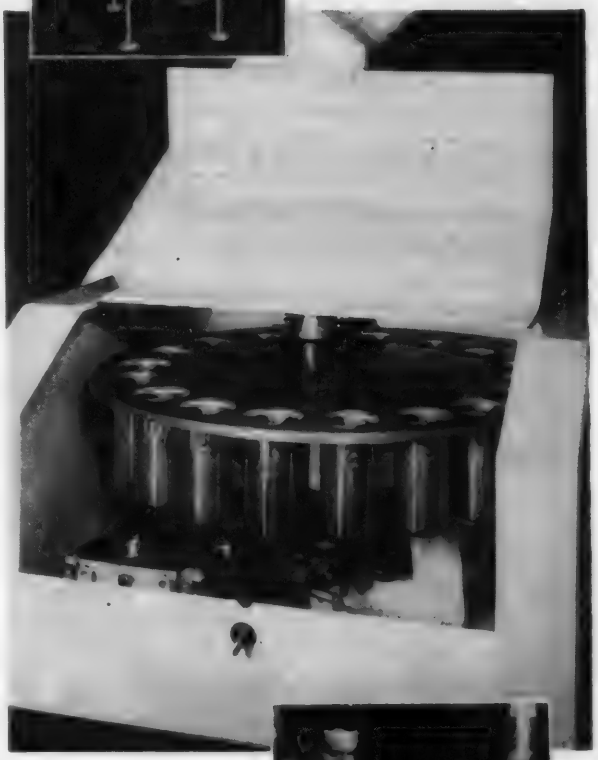

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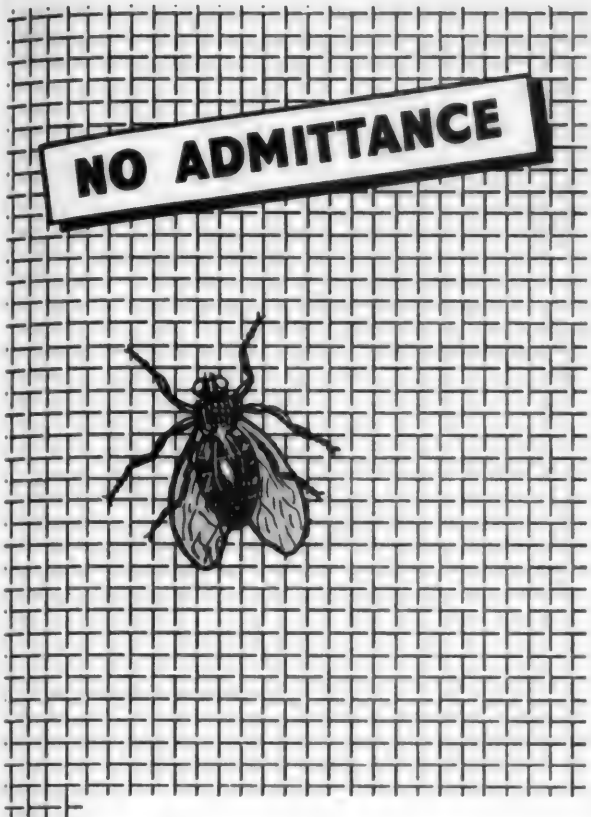

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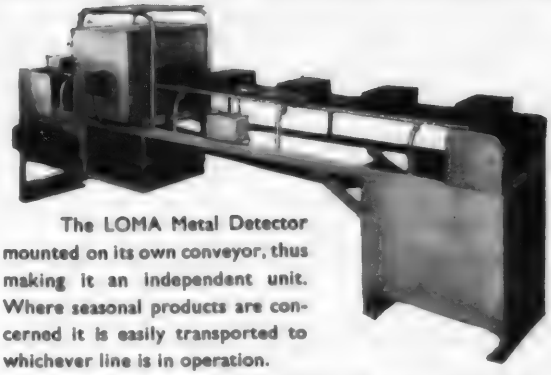

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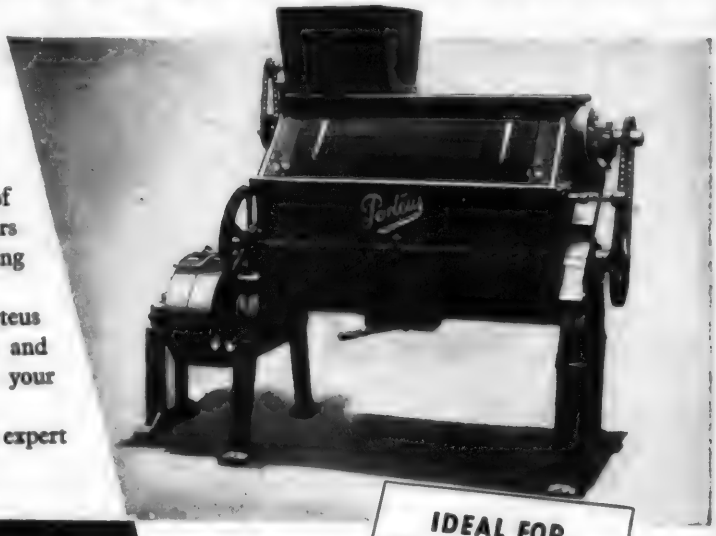

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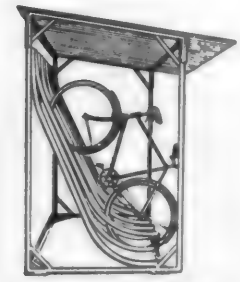
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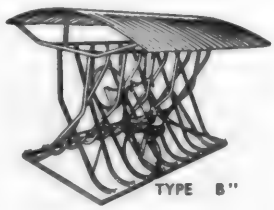
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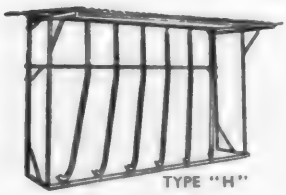
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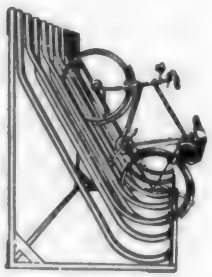
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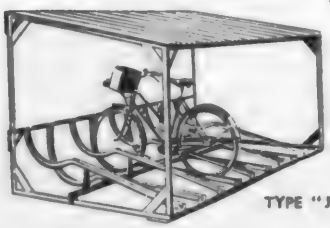
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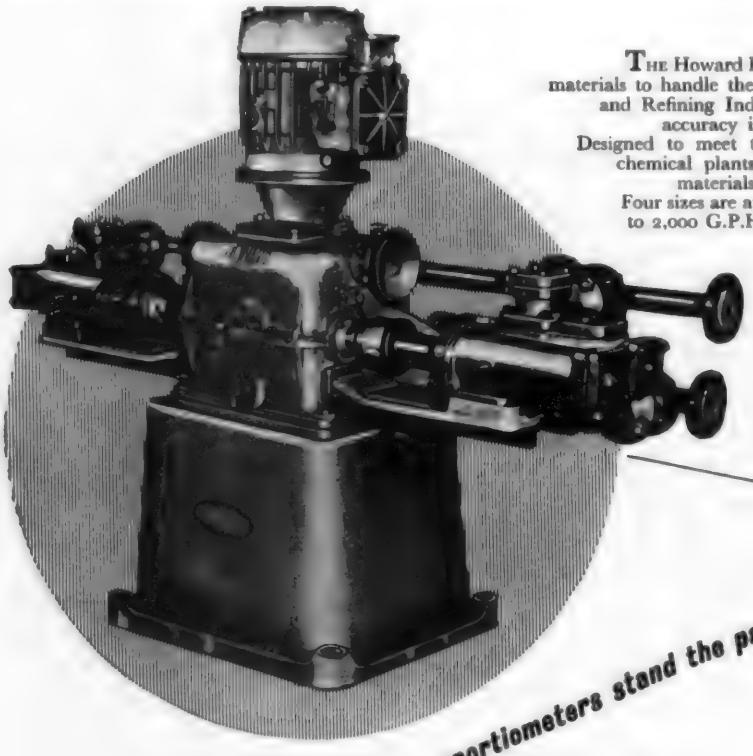

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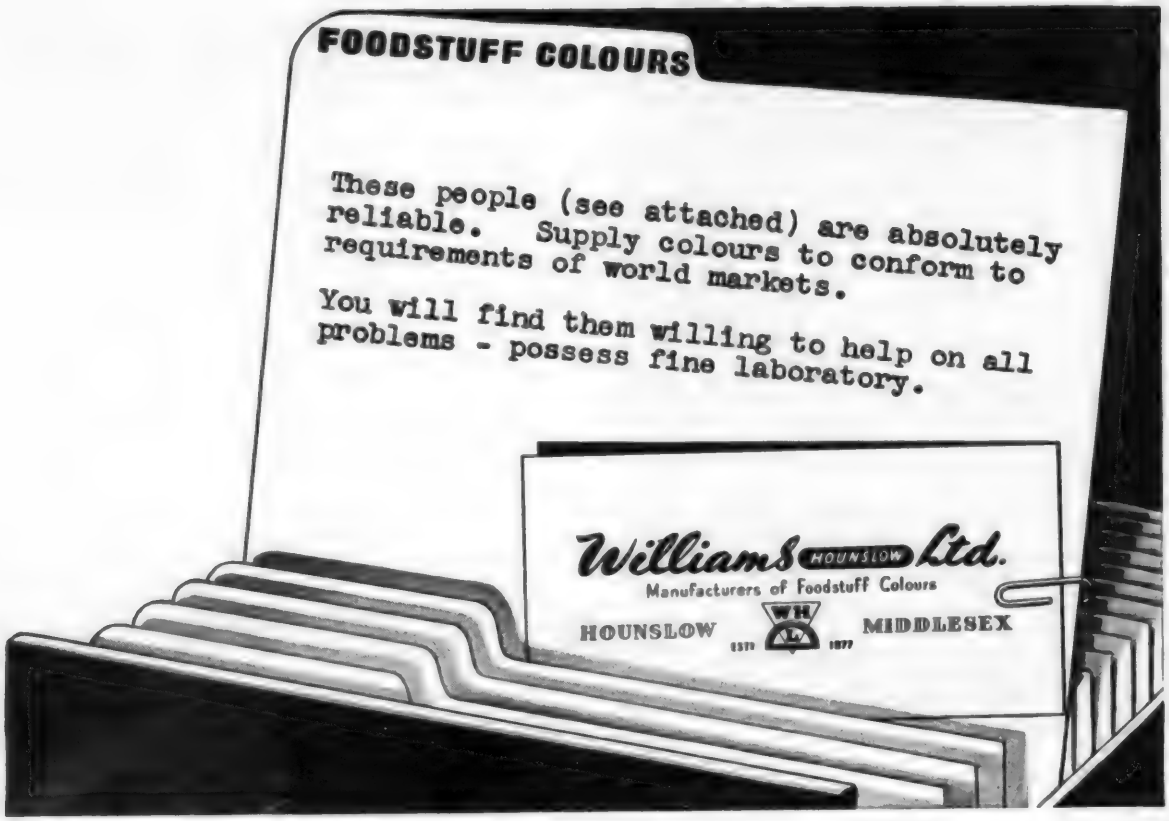
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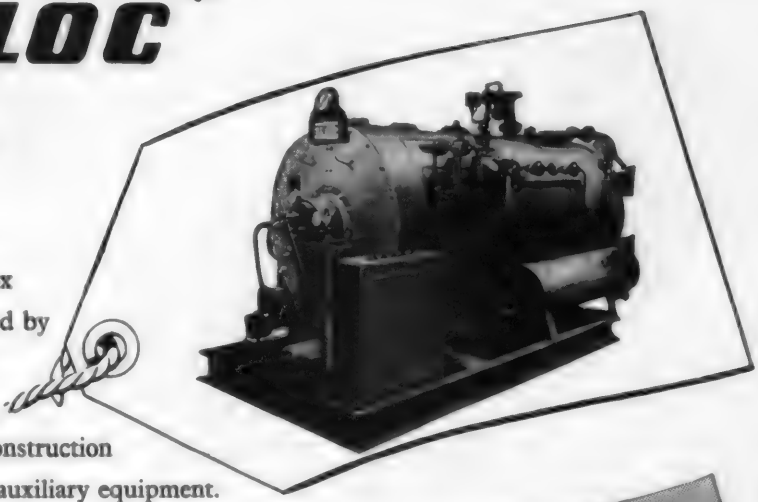

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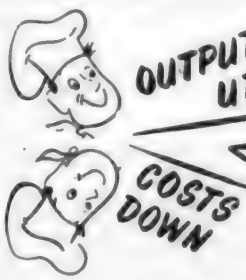

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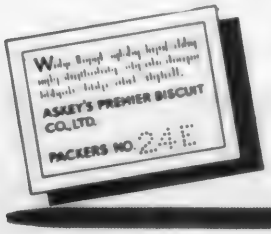

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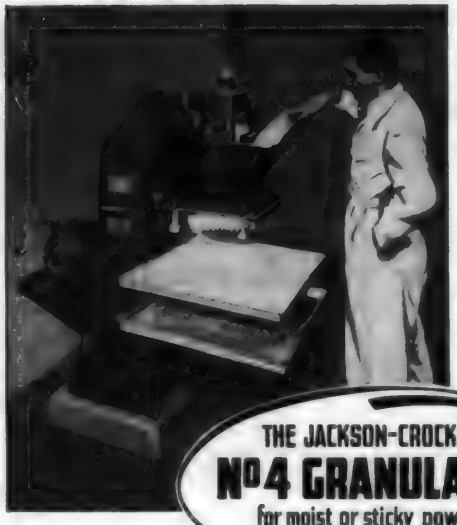

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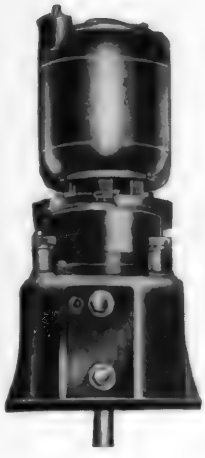

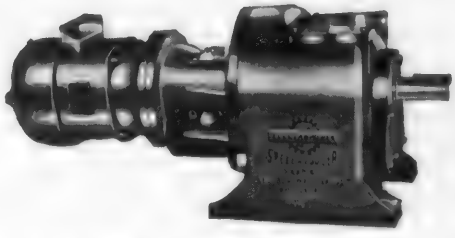

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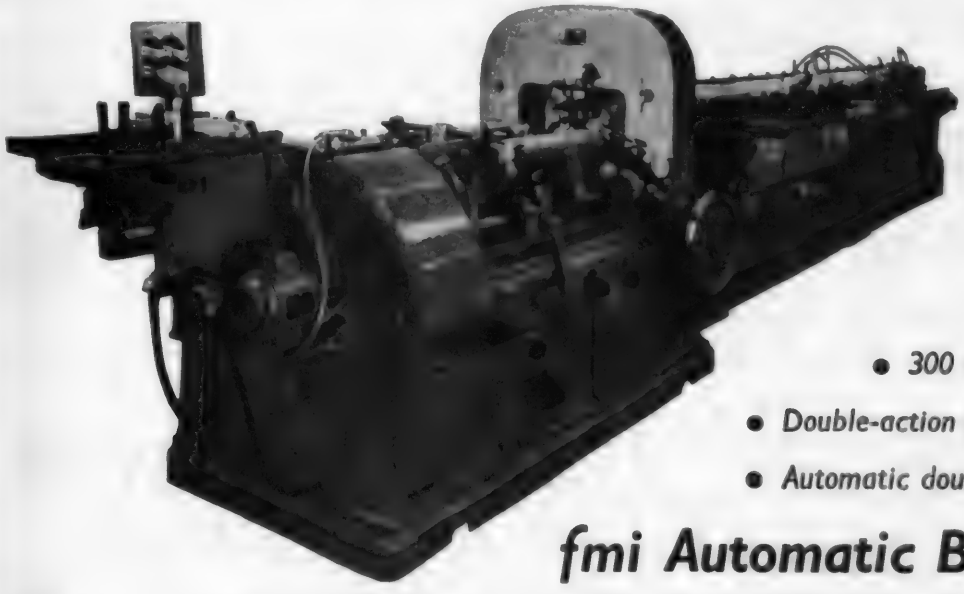

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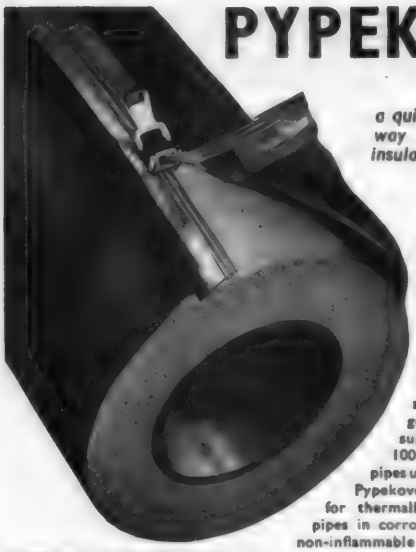

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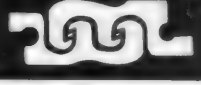

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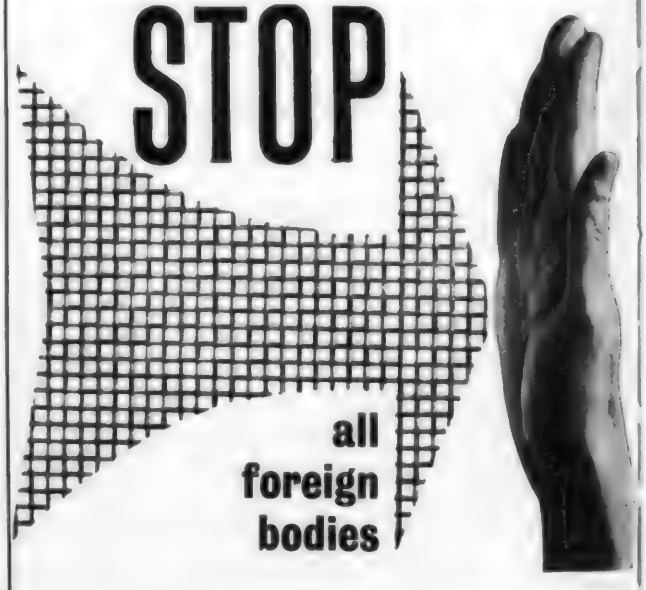

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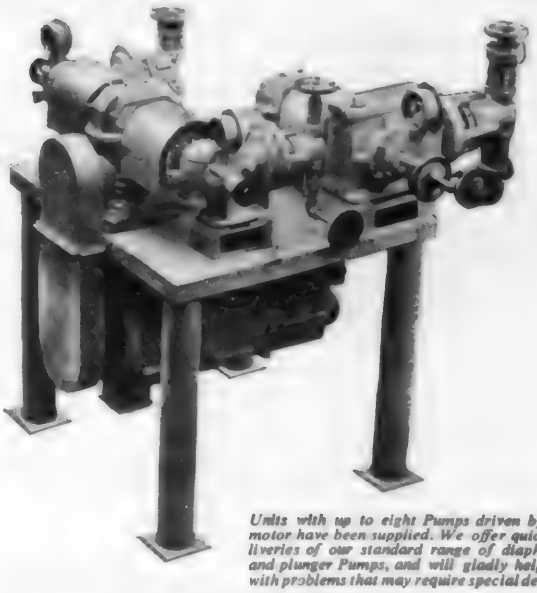

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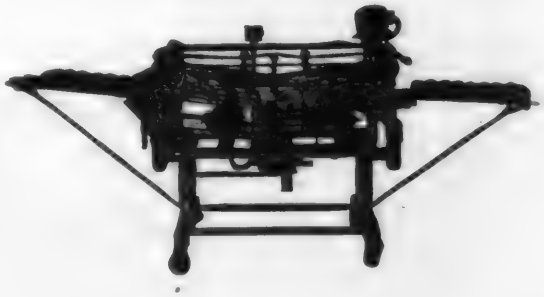

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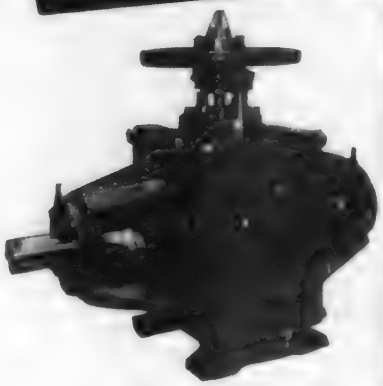

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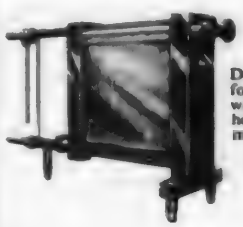

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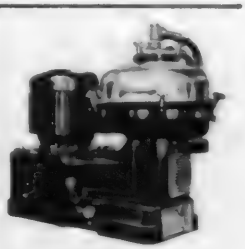

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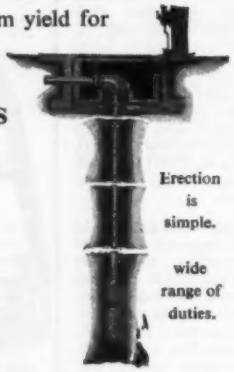

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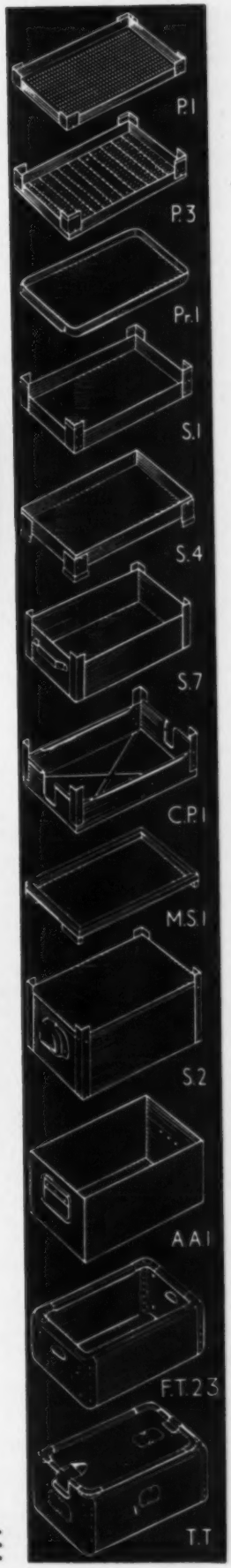

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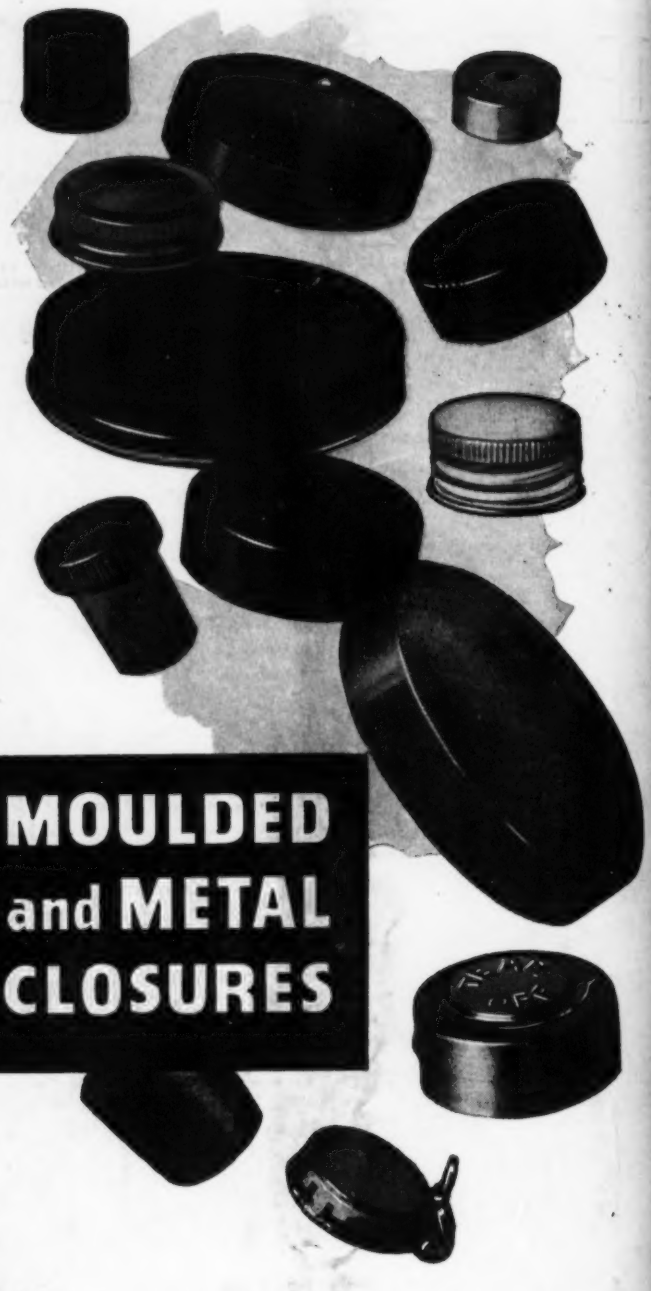

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